

Service Manual

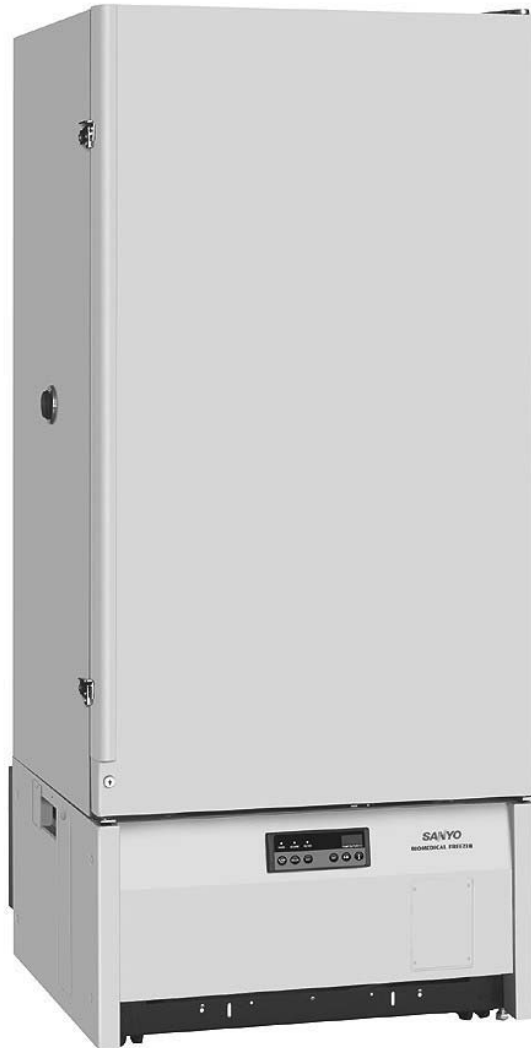
Medical Freezer

MDF-U443

MDF-U442(N)

FILE No.

SANYO Electric Co., Ltd.
Biomedical Business Division



! **RoHS**

This product does not contain any hazardous substances prohibited by the RoHS Directive.
(You will find 'RSF' mark near the rating plate on the RoHS compliant product.)

! **WARNING**

- * You are requested to use RoHS compliant parts for maintenance or repair.
- * You are requested to use lead-free solder.

Effective models

This service manual is effective following models.

Model name	Product code	Voltage and Frequency	
MDF-U443	823 008 53	220V	60Hz
	823 008 54	230/240V	50Hz
	823 008 55	220V	50Hz
MDF-U442(N)	823 008 52	220V	50Hz

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Specifications

■Structural specifications

Item	MDF-U443 / U442(N)
Name	Biomedical freezer
External dimensions	W800 × D832 × H1810 (mm)
Internal dimensions	W640 × D615 × H1090 (mm)
Effective capacity	426 L
Exterior	Painted steel
Interior	Stainless steel plate
Door	Painted steel
Inner door	Acrylic resin, 2 doors
Insulation	Rigid polyurethane foamed-in place
Shelf	Polyethylene coated wire, 5 shelves, Max load; 50kg/shelf
Cooling circuit	Secondary cooling circuit
Condenser fan motor	10W
Cooling fan motor	9W (in the chamber)
Compressor	H stage side; Hermetic rotary type L stage side; Hermetic reciprocate type
Compressor motor	H stage side; Output 400W L stage side; Output 750W
Evaporator	H stage side; Shell and tube type L stage side; Fin and tube type
Condenser	H stage side; Fin and tube type L stage side; Shell and tube type
Refrigerant	H stage side; R-134a L stage side; R-404A
Refrigerating oil	Ze-NIUSL22SA
Power supply	Local voltage
Access port	1 hole on rear left side (φ 40mm)
Battery	For power failure alarm; Nickel-cadmium battery, 6VDC, 1100mAh, Auto-rechargeable (5HR-AAC)
Weight	213 kg
Accessories	1 set of key, 1 temperature sensor cover, 2 nylon clips, 1 scraper
Option	Automatic temperature recorder (MTR-4015LH, MTR-85H)

■Control specifications

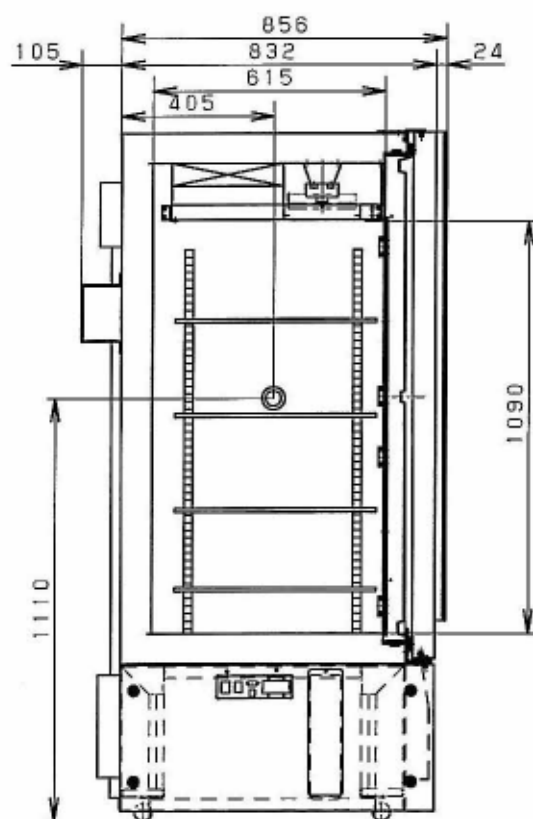
Item		MDF-U443 / U442(N)
Temperature control		Microprocessor control system with non-volatile memory Setting range; -44°C~-15°C (Unit; 1°C)
Temperature sensor		Thermister sensor (502AT-1)
Temperature display		LED digital display (Unit; 1°C)
Alarms	High temp.	5~20°C changeable setting. (Initial; 15°C) 0~15min. for delay time (Initial; 15min.) ALARM lamp blinks, buzzer sounds intermittently with delay and remote alarm activates.
	Low temp.	-5~-20°C changeable setting. (Initial; 15°C) 0~15min. for delay time (Initial; 15min.) ALARM lamp blinks, buzzer sounds intermittently with delay and remote alarm activates.
	Door	DOOR lamp is lit when door is open. 1~15min. for delay time (Initial; 2min.) When door is open, buzzer sounds intermittently with delay time passed.
	Filter	FILTER lamp blinks and buzzer sounds intermittently.
	Power failure	ALARM lamp blinks, buzzer sounds intermittently, and remote alarm activates.
	Remote alarm	Remote alarm terminal 3P; Contact capacity Max. 30VDC, 2A N.C.-COM, N.O.-COM Turns over when temp. alarm or power failure alarm is emitted.
	Battery life	'F1' is displayed when battery accumulating time is about 3 yrs.
	Fan motor life	'F2' is displayed when fan motor accumulation time is about 6 yrs.
Function keys and lamps on Control Panel		Lamp: ALARM, FILTER, DOOR Alarm buzzer stop key: BUZZER Alarm test key: ALARM TEST Set key: SET Digit shift key:  Numerical value shift key:  Manual defrost key: DEF
Key lock		Press  key for 5 seconds. L0: Unlocked L1: Locked
Self-diagnosis		When sensors are failed; ● Error code and chamber temperature are displayed alternately. ● Remote alarm activates and buzzer sounds intermittently.
Compressor protection		For H stage side compressor; Internal thermostat For L stage side compressor; Overload relay
Alarm resume time		Alarm comes back again when unit is still into alarming condition if anyone pressed BUZZER key to stop buzzer sounding. 000: No resume 010~060: 10~60min.
Defrosting		Automatic: Once every 12hrs. Completes when DEF sensor temp. is equal or higher than 5°C.
		Manual: Press DEF key for 5 sec. to start defrosting and press again to stop defrosting forcibly. Completes when DEF sensor temp. is equal or higher than 5°C.

■Performance specifications

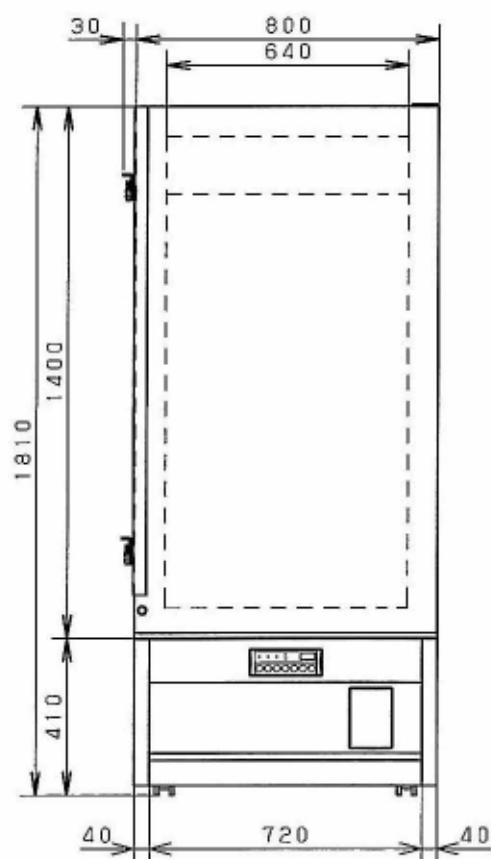
Cooling performance	Center of the chamber: -40°C (AT; 35°C, no load)			
Temp. control range	-15°C~-40°C			
Rated power consumption	220VAC, 50Hz	220VAC, 60Hz	230VAC, 50Hz	240VAC, 50Hz
	630W	670W	640W	680W
Noise level	51 dB (A)			
Maximum pressure	1670 kPa			

Note: Specifications will be subject to change without notice.

Dimensions



Left side



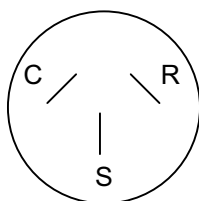
Front side

Cooling unit parts

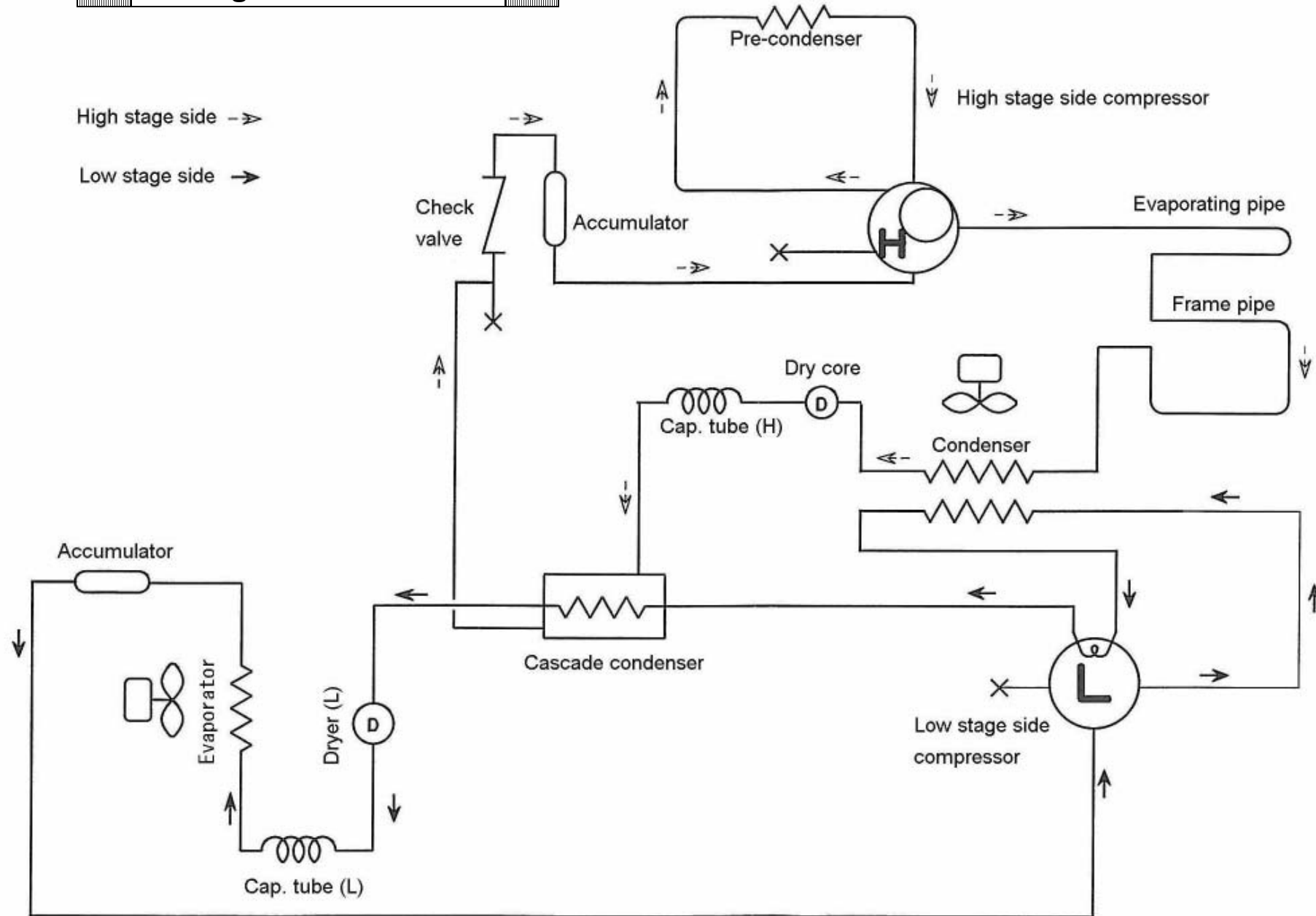
<MDF-U443/U442(N)>

Item	Specifications	
	High stage side	Low stage side
Compressor		
220V, 50Hz	Type:C-1RN4L5C Code:802 012 152	Type:KS200J1NS-4A Code:7FB 0 M101 002 04
230/240V, 50Hz	Type:C-1RN40L5A Code:802 012 152	Type:KS200J1NS-4A1 Code:7FB 0 M101 002 05
220V, 60Hz	Type:C-1RN40L6A Code:802 012 162	Type:KS200J1NS-7A Code:7FB 0 M101 002 06
Refrigerant oil	Ze-NIUSL22SA Charged q'ty: 230cc	Ze-NIUS22LSA Charged q'ty: 850cc
Cooling system	Forced air cooling (partially)	Forced air cooling (partially)
Condenser		
Type	Fin and tube	Cascade condenser
Condenser	12 columns x 2 lines P6.35 mm Fin; 45 pcs.	Coil pipe ϕ 6.35 mm
Pre-condenser	-----	12 columns x 2 lines x W290 mm P6.35 mm
Frame pipe	ϕ 4.76 mm	-----
Evaporator		
Type	Cascade condenser Shell and tube ϕ 80mm	Fin and tube 5 columns x 3 lines ϕ 38mm
Capillary tube		
Resistance PSI $\cdot$ kg/cm ²	57 PSI	54 PSI
Length (mm)	3000	2600
Outer diameter (mm)	ϕ 2.6	ϕ 2.6
Inner diameter (mm)	ϕ 1.4	ϕ 1.4
Refrigerant	R-134a Charged q'ty: 329g	R-404A Charged q'ty: 150g
Oil additive	n-Pentane Charged q'ty: 21g	n-Pentane Charged q'ty: 14g
Dryer	Dry core Charged q'ty: 10g	XH-9 Charged q'ty: 10g
Condensing fan	ϕ 230 mm、4 blades	Material: ABS Output: 11W
Condensing fan motor	Type: SE4-E11L5P	-----
Cooling fan motor	-----	Type: UK4-091J3P

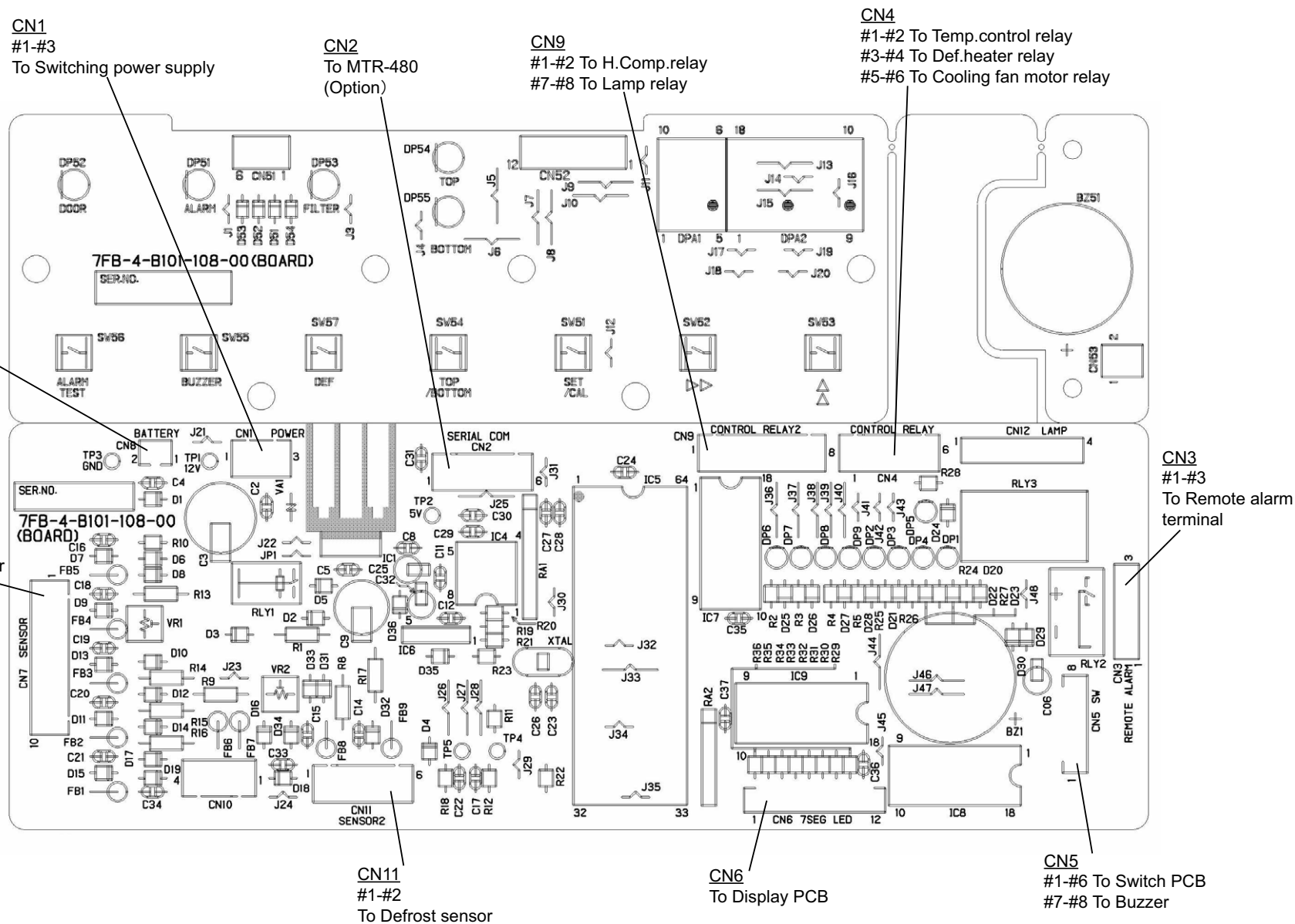
<Compressor terminals layout>



Refrigeration Circuits



x...Point to pull vacuum



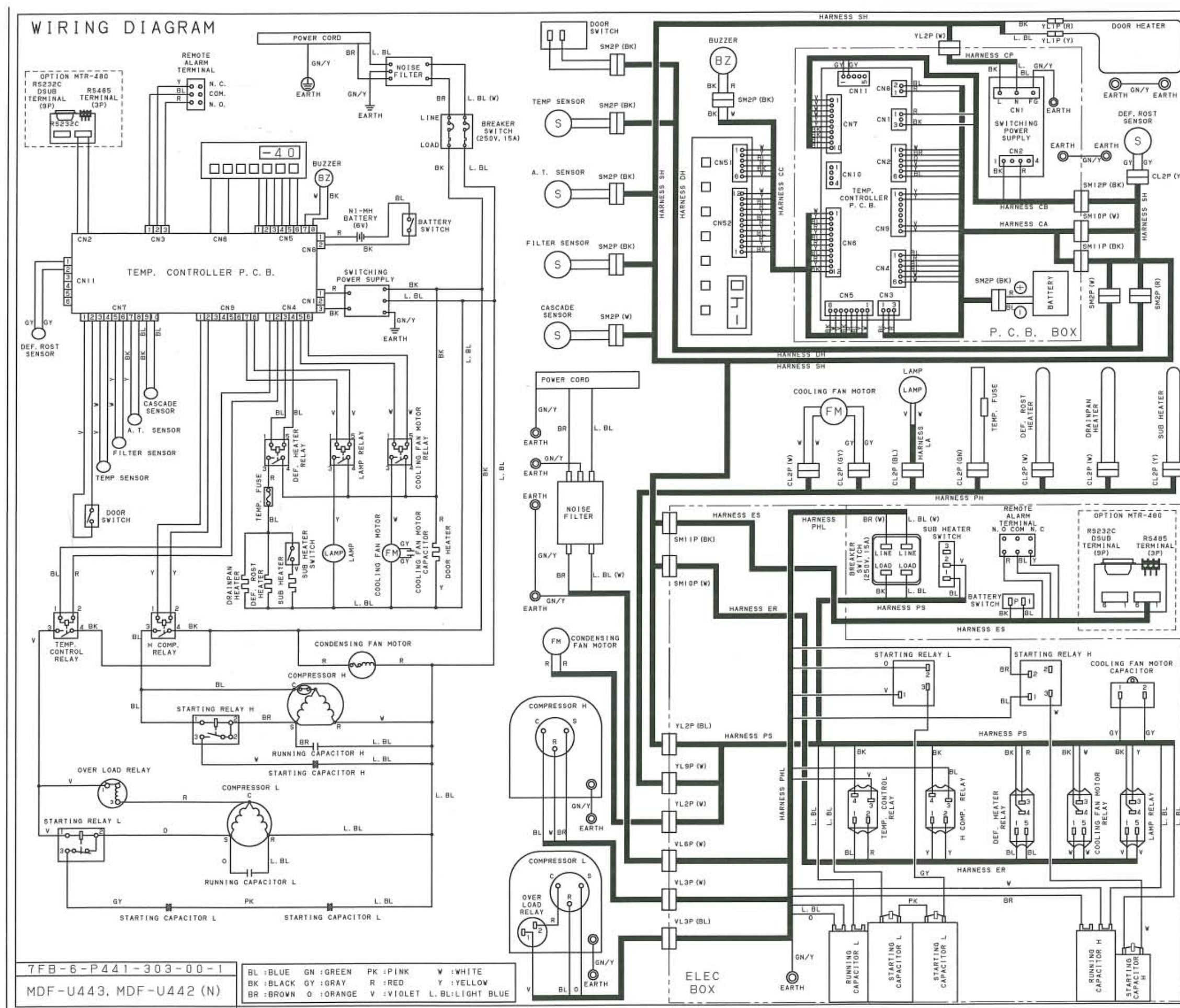
MDF-U443/U442(N)		AC220V, 50Hz	AC230/240V, 50Hz	AC220V, 60Hz
Compressor (L)	Type	KS200J1NS-4A	KS200J1NS-4A1	KS200J1NS-7A
	Code	7FB-0-M101-002-04	7FB-0-M101-002-05	7FB-0-M101-002-06
	Rated voltage	220V, 50Hz	230/240V, 50Hz	220V, 60Hz
	Winding resistance C-R(Main)	2.1Ω	2.7Ω	1.7Ω
	C-S(Aux)	4.6Ω	4.7Ω	4.3Ω
Compressor (H)	Type	C-1RN4L5C	C-1RN4L5C	C-1RN40L6A
	Code	802 012 152	802 012 152	802 012 162
	Rated voltage	220V, 50Hz	220V, 50Hz	220V, 60Hz
	Winding resistance C-R(Main)	7.37 Ω	7.37 Ω	5.34 Ω
	C-S(Aux)	15.76 Ω	15.76 Ω	8.88 Ω
Starting relay (L)	Type	AMVL-300TA	AMVL-300TA	AMVL-300TA
	Pick up voltage	XX~XX VAC	XX~XX VAC	XX~XX VAC
	Drop out voltage	XX~XX VAC	XX~XX VAC	XX~XX VAC
Starting relay (H)	Type	AMVL-300A	AMVL-300A	AMVL-300A
	Pick up voltage	185~217 VAC	185~217 VAC	215~247 VAC
	Drop out voltage	60~120 VAC	60~120 VAC	69~132 VAC
Overload relay	Type	MRA99954-9201	MST16AJ120/61-9201	MRA99954-9201
	Action to the temp. (no current)	ON:135℃ OFF:69℃	ON:120℃ OFF:61℃	ON:135℃ OFF:69℃
	Action to the current (AT25℃)	29.5A	20.5A	29.5A
	Operation time	6~16 sec	6~16 sec	6~16 sec
Starting capacitor (L)	Rating	80 μ F, 500VAC	80 μ F, 500VAC	80 μ F, 500VAC
Starting capacitor (H)	Rating	40 μ F, 300VAC	40 μ F, 300VAC	40 μ F, 300VAC
Running capacitor (L)	Rating	15 μ F, 400VAC	15 μ F, 400VAC	15 μ F, 400VAC
Running capacitor (H)	Rating	12 μ F, 370VAC	12 μ F, 370VAC	12 μ F, 370VAC
Condensing fan motor	Type	SE4-E11L5P	SE4-E11L5P	SE4-E11L5P
	Rating	AC220-240V	AC220-240V	AC220-240V
Cooling fan motor	Type	UK4-091J3P	UK4-091J3P	UK4-091J3P
	Rating	4P 9W 200V	4P 9W 200V	4P 9W 200V
Cooling fan motor cap.	Rating	1.0 μ F, 450VAC	1.0 μ F, 450VAC	1.0 μ F, 450VAC
Cooing fan motor relay	Type	G2R-1A-T	G2R-1A-T	G2R-1A-T
	Rating	12V, 10A, 250V	12V, 10A, 250V	12V, 10A, 250V
Lamp relay	Type	G2R-1A-T	G2R-1A-T	G2R-1A-T
	Rating	12V, 10A, 250V	12V, 10A, 250V	12V, 10A, 250V
Temp. control relay	Type	G2R-1A-T	G2R-1A-T	G2R-1A-T
	Rating	12V, 10A, 250V	12V, 10A, 250V	12V, 10A, 250V
DEF heater relay	Type	G2R-1A-T	G2R-1A-T	G2R-1A-T
	Rating	12V, 10A, 250V	12V, 10A, 250V	12V, 10A, 250V
H comp. relay	Type	G4F-11123T	G4F-11123T	G4F-11123T
	Rating	20A, 12VDC	20A, 12VDC	20A, 12VDC
Temp. fuse	Rating	76℃, 250V, 10A	76℃, 250V, 10A	76℃, 250V, 10A
Door heater	Rating	230VAC	230VAC	230VAC
Drainpan heater	Rating	230V, 75.6W	230V, 75.6W	230V, 75.6W
Defrost heater	Rating	230V, 400W	230V, 400W	230V, 400W
Sub heater	Rating	230V, 170W	230V, 170W	230V, 170W
Temperature sensor	Type	502AT-1	502AT-1	502AT-1
	Rating	5K Ω , 25℃	5K Ω , 25℃	5K Ω , 25℃
Filter sensor	Type	502AT-1	502AT-1	502AT-1
	Rating	5K Ω , 25℃	5K Ω , 25℃	5K Ω , 25℃
AT sensor	Type	502AT-1	502AT-1	502AT-1
	Rating	5K Ω , 25℃	5K Ω , 25℃	5K Ω , 25℃
Defrost sensor	Type	502AT-1	502AT-1	502AT-1
	Rating	5K Ω , 25℃	5K Ω , 25℃	5K Ω , 25℃
Cascade sensor	Type	502AT-1	502AT-1	502AT-1
	Rating	5K Ω , 25℃	5K Ω , 25℃	5K Ω , 25℃
Door switch	Type	PS-500-605	PS-500-605	PS-500-605
	Rating	200V, 0.5A	200V, 0.5A	200V, 0.5A
Breaker switch	Type	BAM215131	BAM215131	BAM215131
	Rating	250VAC, 15A	250VAC, 15A	250VAC, 15A
Sub heater switch	Type	HLS112D	HLS112D	HLS112D
	Rating	AC250V, 6A	AC250V, 6A	AC250V, 6A
Battery	Type	5HR-AAC	5HR-AAC	5HR-AAC
	Rating	6V, 1100MAH	6V, 1100MAH	6V, 1100MAH
Battery switch	Type	SLE6A2-5	SLE6A2-5	SLE6A2-5
	Rating	4A, 250V	4A, 250V	4A, 250V
Switching power supply	Type	ZWS10-12/J	ZWS10-12/J	ZWS10-12/J
	Rating	12VDC, 0.85A	12VDC, 0.85A	12VDC, 0.85A
Lamp	Type	DKT22250-15	DKT22250-15	DKT22250-15
	Rating	250V, 15W	250V, 15W	250V, 15W
Noise filter	Type	ZHG2210-11	ZHG2210-11	ZHG2210-11
	Rating	250VAC, 10A	250VAC, 10A	250VAC, 10A

Specifications of sensor

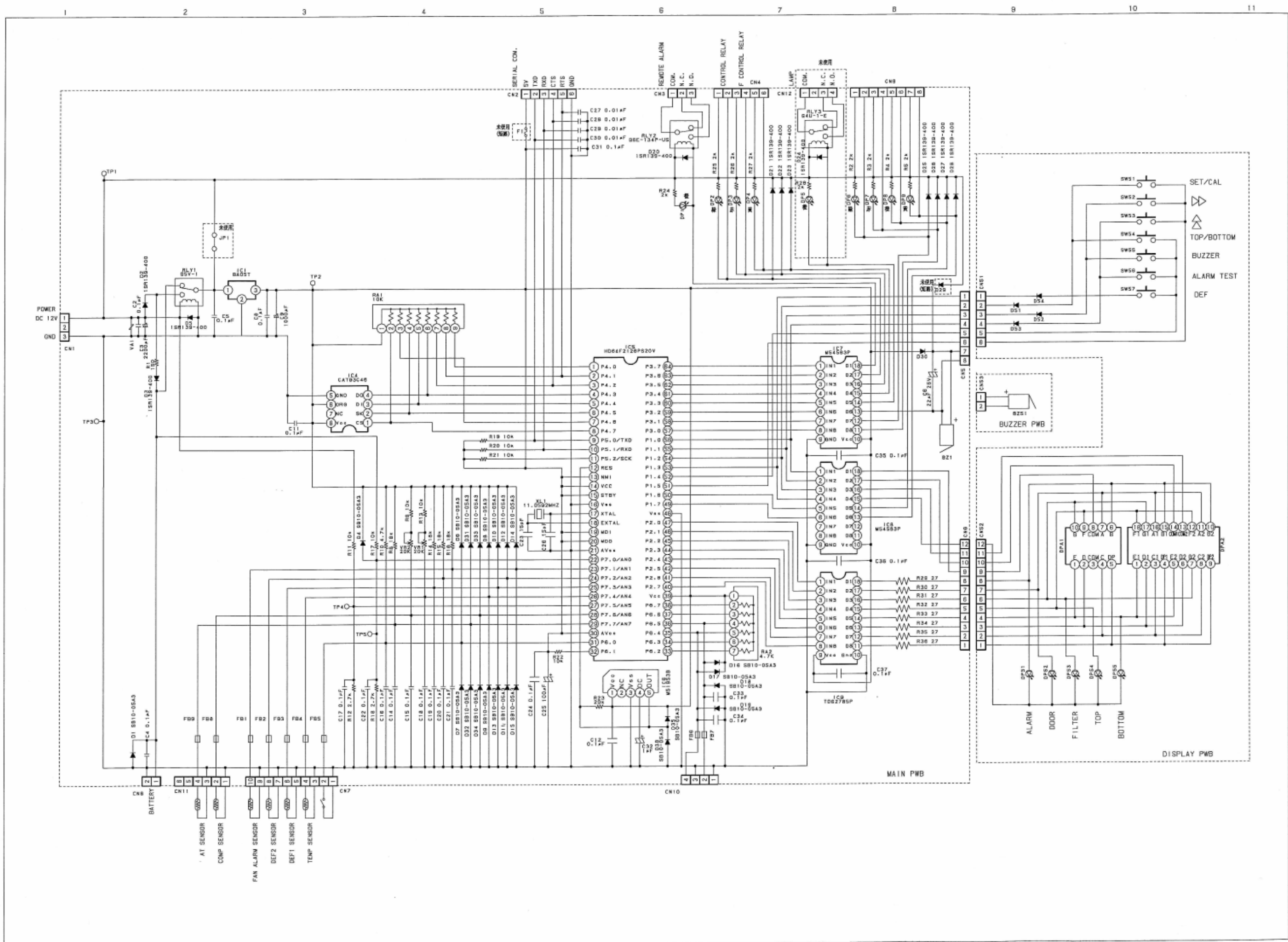
1. Following shows the temperature of temp. sensor (502AT-1) and its resistance value.

Temperature (°C)	Resistance (kΩ)	Temperature (°C)	Resistance (kΩ)	Temperature (°C)	Resistance (kΩ)	Temperature (°C)	Resistance (kΩ)
−50	154.5	−36	71.80	−22	35.65	0	13.29
−49	145.9	−35	68.15	−21	33.99	5	10.80
−48	137.8	−34	64.71	−20	32.43	10	8.84
−47	130.2	−33	61.48	−19	30.92	15	7.20
−46	123.1	−32	58.43	−18	29.50	20	6.01
−45	116.5	−31	55.55	−17	28.14	25	5.00
−44	110.2	−30	52.84	−16	26.87	30	4.17
−43	104.4	−29	50.23	−15	25.65	35	3.50
−42	98.87	−28	47.77	−14	24.51	40	2.96
−41	93.70	−27	45.45	−13	23.42	45	2.51
−40	88.85	−26	43.26	−12	22.39	50	2.13
−39	84.18	−25	41.19	−11	21.41	55	1.82
−38	79.80	−24	39.24	−10	20.48	60	1.56
−37	75.67	−23	37.39	−5	16.43	65	1.35

Wiring Diagram



Circuit Diagram



DO NOT SCALE THIS DRAWING
3232 A2

Connection on PCB

The following shows connections of connector on Temp. Control PCB.

Connector	Connects to	Usage
CN1	#1 - #3: Switching power supply	To supply the power to PCB.
CN2	MTR-480 (Option)	To connect with MTR-480.
CN3	Remote alarm terminal #1: COM #2: N.C. #3: N.O.	Remote alarm contact outputs. In normal condition, open for #1-#3 and closed for #1-#2.
CN4	#1 - #2: Temp. control relay #3 - #4: Def. heater relay #5 - #6: Cooling fan motor relay	To connect with temp. control relay To connect with Def. heater relay To connect with Cooling fan motor heater relay
CN5	To Display PCB #7 - #8: Buzzer	To connect with Display PCB To control buzzer
CN6	To Display PCB	To connect with Display PCB
CN7	#1 - #2: Door switch #3 - #4: Temp. sensor #5 - #6: Filter sensor #7 - #8: A.T. sensor #9 - #10: Cascade sensor	To control door switch To detect internal temperature To detect temperature in outlet pipe To detect ambient temperature To detect cascade temperature
CN8	#1 - #2: Battery (DC6V)	To input back up power supply
CN9	#1 - #2: H comp. relay #7 - #8: Lamp relay	To connect with H. comp relay To connect with Lamp relay
CN11	#1 - #2: Defrost sensor	To detect temperature in evaporator during defrost.

Control specification

1. Key and Switch

- BUZZER** : In alarm condition, buzzer stops sounding with this key pressed.
Remote alarm output and alarm message would not be off.
During the power failure (battery back-up), press the key to show the chamber temperature for 5 seconds.
- ALARM TEST** : With this key pressed to activate alarm test mode to be forcibly step into alarm condition (ALARM lamp blinks, intermittent buzzer beeps, digital LED goes off and remote alarm activates).
After approx. 90seconds then, unit retrieves normal condition by Auto Return.
With the battery switch turns off, "E09" blinks on the display.
- DEF** : With this key pressed for 5 seconds to start manual defrosting.
During defrost, 'dF' and chamber temperature are alternately displayed.
During 'Con' and chamber temperature are displayed, you cannot start manual defrosting.
During defrost, press this key again to stop defrosting.
- SET/CAL** : Press this key once to activate set mode (2nd digit in LED blinks), press the key again to store the value to be changed.
-  During setting mode, the blinking digit shifts among the 1st digit or the 2nd digit or 3rd digit.
In chamber temperature display, press this key over 5 seconds to shift to Key Lock screen with 'L_0' displayed.
-  During setting mode, count the blinking digit up. In chamber temperature display, press the key over 5 seconds to enter the function mode. ("F00" is displayed)

2. Temperature control

- Setting range** : -44°C~-15°C
- Display range** : -65°C~+50°C
- Setting procedure** : Press SET key and set the required value with  key and  key.
Press SET key to store the set value.
- Unacceptable setting range** : If you try to set the value which deviates from setting range, the buzzer beeps for 1 second to inform the value unacceptable.

3. Key Lock mode and Function mode

- Setting range** : 0, 1
- Setting procedure**: In chamber temperature display, keep pressing  key over 5 seconds to enter into Key Lock mode. ("L_0" or "L_1" is displayed. initial: L_0) with "0" or "1" blinks.
Change the value with  key and press SET key to store the value in the non-volatile memory.
0: Key Lock inoperative
1: Key Lock operative

4. Defrosting

- Automatic defrost : Starts every 12 hours within 1 hour since L side compressor turns off. If L side compressor keeps turning on for 1 hour, automatic defrosting forcibly starts.
When temperature in DEF sensor is equal or higher than 5°C, DEF heater turns off and L side compressor turns on.
During defrost, 'dF' and chamber temperature are alternately displayed.
Indication is OFF when the difference between chamber temperature and set temperature are equal or lower than 5°C, or when it passed 30 minutes since temperature in DEF sensor is equal or higher than 5°C.
- Manual defrost : Starts when you press DEF key for 5 seconds.
Press DEF key again to stop defrosting.
- Control : (1) Condensing fan motor turns off and DEF heater turns on until temperature in DEF sensor is reached to 5°C.
(2) Condensing fan motor and DEF heater turn off and L side compressor turns on when temperature in DEF sensor is equal or higher than 5.1°C.
(3) Cooling fan motor turns on when the difference between set temperature and temperature in DEF sensor is equal or less than 5°C

5. Function mode

- Setting range : 00~32, 50
Display range : 00~59
00, 18, 19, 23, 33~49, 51~59 are unused.
- Setting procedure : In chamber temperature display, keep pressing  key over 5 seconds to enter function mode (F00 is displayed). Change the blinking 1st digit to desired function code with  key and  key. Press SET key to be function code available.
If you input 00, 18, 19, 23 after '384' was input in F06, press SET key to revert to chamber temperature display.
- Unacceptable setting range : If you try to input the value among 33~49 and 51~59 after '384' was input in F06, the buzzer sounds to inform the value unacceptable.

6. Auto return

If there are not any key operations during setting mode or Key lock mode or Function mode or Alarm test, unit automatically reverts to chamber temperature display.
Displayed value is not memorized in non-volatile memory.

7. Error codes

- E01: Temp. sensor is disconnected
- E02: Temp. sensor is short circuited
- E03: Defrost sensor is disconnected
- E04: Defrost sensor is short circuited
- E05: Filter sensor is disconnected
- E06: Filter sensor is short circuited
- E07: AT sensor is disconnected
- E08: At sensor is short circuited
- E09: Battery switch is off position
- E10: Condenser temperature is abnormal or Fan motor is locked
- E11: Cascade sensor is disconnected
- E12: Cascade sensor is short circuited

(1) Temp. sensor

- Disconnected(E01): When temperature in temp. sensor is equal or lower than -60°C, E01 and '-65' are displayed alternately and the buzzer sounds intermittently and remote alarm contact turns over.
L side compressor keeps running.
Press BUZZER key to stop the buzzer sounding.
- Short circuit (E02) : When temperature in temp. sensor is equal or higher than +60°C, E02 and '+60' are displayed alternately and the buzzer sounds intermittently and remote alarm contact turns over.
L side compressor keeps running.
Press BUZZER key to stop the buzzer sounding.

(2) Defrost sensor

- Disconnected(E03): When temperature in defrost sensor is equal or lower than -60°C, E03 and chamber temperature are displayed alternately and the buzzer sounds intermittently and remote alarm contact turns over.
Press BUZZER key to stop the buzzer sounding.
- Short circuit (E04) : When temperature in defrost sensor is equal or higher than +60°C, E04 and chamber temperature are displayed alternately and the buzzer sounds intermittently and remote alarm contact turns over.
Press BUZZER key to stop the buzzer sounding.

(3) Filter sensor

- Disconnected(E05): When the temperature in filter sensor is equal or lower than -60°C, E05 and chamber temperature are displayed alternately, the buzzer sounds intermittently and remote alarm contact turns over.
Press BUZZER key to stop the buzzer sounding.
- Short circuit (E06): When the temperature in filter sensor is equal or higher than +130°C, E06 and chamber temperature are displayed alternately, the buzzer sounds intermittently and remote alarm contact turns over.
Press BUZZER key to stop the buzzer sounding.

(4) AT sensor

- Disconnected(E07): When the temperature in AT sensor is equal or lower than -60°C, E07 and chamber temperature are displayed alternately, the buzzer sounds intermittently and remote alarm contact turns over.
Press BUZZER key to stop the buzzer sounding.
- Short circuit (E08) : When the temperature in AT sensor is equal or higher than +60°C, E08 and chamber temperature are displayed alternately, the buzzer sounds intermittently and remote alarm contact turns over.
Press BUZZER key to stop the buzzer sounding.

(5) Cascade sensor

- Disconnected(E11): When temperature in cascade sensor is equal or lower than -60°C, E11 and chamber temperature are displayed alternately, the buzzer sounds intermittently and remote alarm contact turns over.
Press BUZZER key to stop the buzzer sounding.
- Short circuit (E12) : When temperature in cascade sensor is equal or higher than +60°C, E12 and chamber temperature are displayed alternately, the buzzer sounds intermittently and remote alarm contact turns over.
Press BUZZER key to stop the buzzer sounding.

(6) Battery SW is off position (E09):

If you press ALARM TEST key when battery switch is off position or battery is unconnected, ALARM lamp and 'E09' blink.
This is not emitted during power failure.

(7)Condenser abnormal temperature (E10): When the temperature in filter sensor is equal or higher than 70°C, E10 and chamber temperature are displayed alternately and H side compressor is forcibly turned off to inform condenser temperature is abnormal or fan motor is locked.
Press BUZZER key to stop the buzzer sounding.
When the temperature in filter sensor – AT is equal or lower than 10°C, H side and L side compressors are turned on.

8. Alarms

High temp. alarm : When chamber temperature is equal or higher than set temperature + high temp. alarm set temperature +1.0, ALARM lamp and LED display blink, intermittent buzzer sounds with about 15 minutes of delay and remote alarm turns over.
When chamber temperature is equal or lower than set temperature, ALARM lamp and LED display go off, buzzer stops sounding and remote alarm turns over again.
If you press BUZZER key, the buzzer stops sounding instead remote alarm does not activate.

Low temp. alarm : When chamber temperature is equal or lower than set temperature - low temp. alarm set temperature -1.0, ALARM lamp and LED display blink, intermittent buzzer sounds with about 15 minutes of delay and remote alarm turns over.
When chamber temperature is equal or higher than set temperature – low temp. alarm set temperature, ALARM lamp and LED display go off, buzzer stops sounding and remote alarm turns over again.
If you press BUZZER key, the buzzer stops sounding instead remote alarm does not activate.

Door alarm : Leave the outer door open and DOOR lamp (DP52) and chamber lamp are lit. Buzzer sounds intermittently after 1~15 minutes (Door alarm setting time) has elapsed. (Initial setting: 2 min) Buzzer does not activate simultaneously with remote alarm. Once you press BUZZER key, buzzer does not sound again
When the outer door is shut, DOOR lamp and chamber lamp go off.

Power failure alarm : With the battery switch is on position and power switch is turned off or the power is interrupted for 3 seconds, ALARM lamp blinks and intermittent buzzer beeps and remote alarm activates.
When the power retrieves within 3 seconds after the power failed, micro computer is initialized and remote alarm turns over.
Press BUZZER key to stop buzzer sounding instead remote alarm does not turn over again.
Remote alarm does not activate until chamber temperature is not stabilized after power failed.
You can check chamber temperature for 5 seconds if you press BUZZER key during power failure.

Filter alarm : Filter alarm is emitted when temperature in filter sensor is equal or higher than +53 °C . FILTER lamp blinks and buzzer sounds intermittently.
Filter alarm turns off when temperature in filter sensor is lower than +48°C. FILTER lamp goes off and buzzer stops sounding.
Remote alarm does not turns over during filter alarm.
Auto return does not activate.

9. Other functions

Alarm resume time :	This is the function to prevent someone pressing BUZZER key to stop buzzer beeping when the unit is into alarming condition. Press BUZZER key to stop buzzer sounding. Buzzer sounds again after a certain alarm resume time elapses. Alarm resume time is settable in F25. (See Function mode for details)
Sensor temperature :	F12: Temperature of temp. sensor is displayed (Ex. -40.2°C → displayed as '40.2') F13: Temperature of defrost sensor is displayed. (Ex. -35°C → displayed as '-35') F14: Temperature of filter sensor is displayed. (Ex. +26°C → displayed as '026') F15: Temperature of AT sensor is displayed. (Ex. +21°C → displayed as '021') F16: Temperature of cascade sensor is displayed (Ex. -35°C → displayed as '-35')
Battery accumulation time :	F03: Battery accumulation time is displayed. (Ex. 2years and 6months accumulated → displayed as '02.5') The display shows '02.8' to inform the battery exhaustion. Then replace with new battery. <Reset of accumulation time> Step into F06. Input '409' and press SET key to turn the display to '00.0' with BATTERY lamp goes off.
Condensing fan motor accumulation time :	F32: Condensing fan motor accumulation time is displayed. (Ex. 5years and 8months consumed → displayed as '05.8') <Reset of accumulation time> Step into F06. Input '419' and press SET key to turn the display to '00.0'.
ROM version :	F30: ROM version is displayed (Ex. Ver. 1.00 → displayed as "1.00")

10. Function mode

F00	Unused
F01	Setting of high temp. alarm
F02	Setting of low temp. alarm
F03	Display of battery accumulation time
F04	Setting of Door alarm delay time
F05	Setting of L side compressor delay time
F06	Service code input (code: 384)
F07 *	Temp. sensor Zero Adjustment
F08 *	Defrost sensor Zero Adjustment
F09	Factory test mode Unavailable
F10	Factory test mode Unavailable
F11	PCB manufacturer test mode Unavailable
F12 *	Display of temperature in temp. sensor
F13 *	Display of temperature in defrost sensor
F14 *	Display of temperature in filter sensor
F15 *	Display of temperature in AT sensor
F16*	Display of temperature in cascade sensor
F17 *	Model code setting (Initialization of non-volatile ROM and memory)
F18 *	Unused
F19	Unused

F20	Factory test mode Unavailable
F21	Communication ID set
F22	Communication mode set
F23	Unused
F24	Remote alarm terminal output
F25	Alarm resume time (Ring back) set
F26 *	Display of actual operation rate Unavailable
F27 *	Display of diagnosis value for running rate Unavailable
F28	Unused
F29	Unused
F30 *	ROM version is displayed
F31 *	Filter alarm
F32 *	Display of condensing fan motor accumulating time
F50	Setting of temp. alarm delay time

Setting procedure: In chamber temperature display, keep pressing  key over 5seconds to display "F00".

Input the desired function code with  key and  key.

Press SET key to be function mode available.

* ... You should input service code in F06 beforehand.

To cancel service code, input "000" in F06 or turn the power off.

- F01: <Function> To set high temp. alarm
 <Operation> Input F01 and press SET key to display "015" (initial value).
 Set the value in the range "005"~"020" with  key and  key.
 Press SET key to store the value and revert to chamber temperature display.
- F02: <Function> To set low temp. alarm
 <Operation> Input F02 and press SET key to display "-15" (initial value).
 Set the value in the range "-05"~"-20" with  key and  key.
 Press SET key to store the value and revert to chamber temperature display.
- F03: <Function> Battery accumulation time is displayed
 <Operation> Input F03 and press SET key to display alternately F03 with
 "00.0" (in case battery was used for 36days or less). Press SET
 key to revert to chamber temperature display.
 <Reset> Input '409' and press SET key to initialize battery accumulation
 time. ('00.0' is displayed)
- F04: <Function> Door alarm delay time is set
 <Operation> Press SET key in "F04" displayed to display '002' (initial setting).
 Change your desired value among '001'~'015' with  key and
  key and press SET key to store the value and revert to
 chamber temperature display.
- F05: <Function> To have L side compressor being started with delay when the
 power is supplied or the power retrieves from the power failure.
 (Unit: Minute)
 <Operation> Input "F05" and press SET key to display "002" (initial).
 Change the value in the range "002"~"015" with  key and  key.
 Press SET key to store the value and revert to chamber
 temperature display.

- F06: <Function> Dividing F-code for customer used from service
 <Operation> Input F06 and press SET key to display "000" (initial value).
 Set to "384" with  key and  key. Press SET key to store the value and revert to chamber temperature display.
- <Reset of battery accumulation time>
 Input service code, '384' then '409' to reset battery accumulation time. Unit automatically reverts to chamber temperature display.
- <Reset of fan motor accumulation time>
 Input service code, '384' then '419' to reset fan motor accumulation time. Unit automatically reverts to chamber temperature display.
- <Cancel> Input F06 and press SET key to display "384".
 Change to "000" with  key and  key. Press SET key to store the value and revert to chamber temperature display.
 Service code '384' is not effective after the reset of battery or fan motor accumulation time.
 Power the unit on and off to initialize ('000') service code which is not memorized in non-volatile memory.
 Note) '384' is stored in non-volatile memory during battery back-up.
 (battery SW is ON)
- F07: <Function> To match temperature of temp. sensor with temperature of center at the chamber.
 <Operation> Input service code in F06 prior to use this mode.
 Input F07 and press SET key to display "00.0" (initial value).
 Change to the desired value in the range "-9.9"~"09.9" with  key and  key.
 Press SET key to store the value and revert to chamber temperature display.
- F08: <Function> To calibrate temperature of defrost sensor
 <Operation> Input service code in F06 prior to use this mode.
 Input F08 and press SET key to display "00.0" (initial value).
 Change to the desire value in the range "-9.9"~"09.9" with  key and  key.
 Press SET key to store the value and revert to chamber temperature display.
- F12: <Function> To display the temperature of temp. sensor
 <Operation> Input service code in F06 prior to use this mode.
 Input F12 and press SET key to display alternately F12 and "XX.X" (chamber temperature). Press SET key to revert to chamber temperature display. 3 digits indication. Minus "-" is not indicated.
 Ex) "-49.5°C" → indicated as "49.5"
- F13: <Function> To display the temperature of defrost sensor
 <Operation> Input service code in F06 prior to use this mode.
 Input F13 and press SET key to display alternately F13 and "XX.X" (present temperature of cascade sensor). Press SET key to revert to chamber temperature display.
- F14: <Function> To display the temperature of filter sensor
 <Operation> Input service code in F06 prior to use this mode.
 Input F14 and press SET key to display alternately F14 and "XX.X" (present temperature of filter sensor). Press SET key to revert to chamber temperature display.

- F15: <Function> To display the temperature of AT sensor
 <Operation> Input service code in F06 prior to use this mode.
 Input F15 and press SET key to display alternately F15 and
 "XX.X" (present temperature of AT sensor). Press SET key to
 revert to chamber temperature display.
- F16: <Function> To display the temperature of cascade sensor
 <Operation> Input service code in F06 prior to use this mode.
 Input F15 and press SET key to display alternately F15 and
 "XX.X" (present temperature of cascade sensor). Press SET key
 to revert to chamber temperature display.
- F17: <Function> Non-volatile memory initialization, model code change
 <Operation> Service code should be input in F06 prior to use this mode.
 Input F17 and press SET key to display "001". Change the value
 with  key and  key. Press SET key to store and revert to
 chamber temperature display.
 Model code '003': MDF-U443/U442(N)
- <Initial values in Non-volatile memory>
 PT sensor Zero Adjustment value : 0°C
 Defrost sensor Zero Adjustment value : 0°C
 Auto Recovery time : 30 min.
 Chamber temperature : -40 C
 Door alarm delay time : 2 min.
 High temp. alarm temperature : +15°C
 Low temp. alarm temperature : - 15°C
 L side compressor delay time : 5 min.
 Communication ID : 000
 Communication mode : 000
 Key Lock : OFF
 Remote alarm and buzzer operation : OFF
 Filter alarm buzzer : ON
 Diagnosed running rate : Fixed
 Data to check non-volatile memory
- F21: <Function> Serial communication ID setting
 <Operation> Input F21 and press SET key to display "000" (initial).
 Change the value in the range "001"~"255" with  key and  key.
- F22: <Function> Serial communication mode setting
 <Operation> input F22 and press SET key to display "000" (initial value)
 Change the value with  key and  key.
 Press SET key to store the value and revert to PV display.
 Control mode (the 3rd digit)
 0: Local (initial)
 1: Remote
 Baud rate (the 2nd digit)
 0: 2400bps (initial)
 1: 4800bps
 2: 9600bps
 Note) You cannot be changed SV if control mode is set in "Remote".
- F24: <Function> To set remote alarm and buzzer operation
 <Operation> Input F24 and Press SET key to display "000" (initial).
 Change to the desired value with  key and  key.
 Press SET key to store the value and revert to chamber
 temperature display.
 000: Remote alarm operation is not synchronous with buzzer
 001: Remote alarm operation is synchronous with buzzer

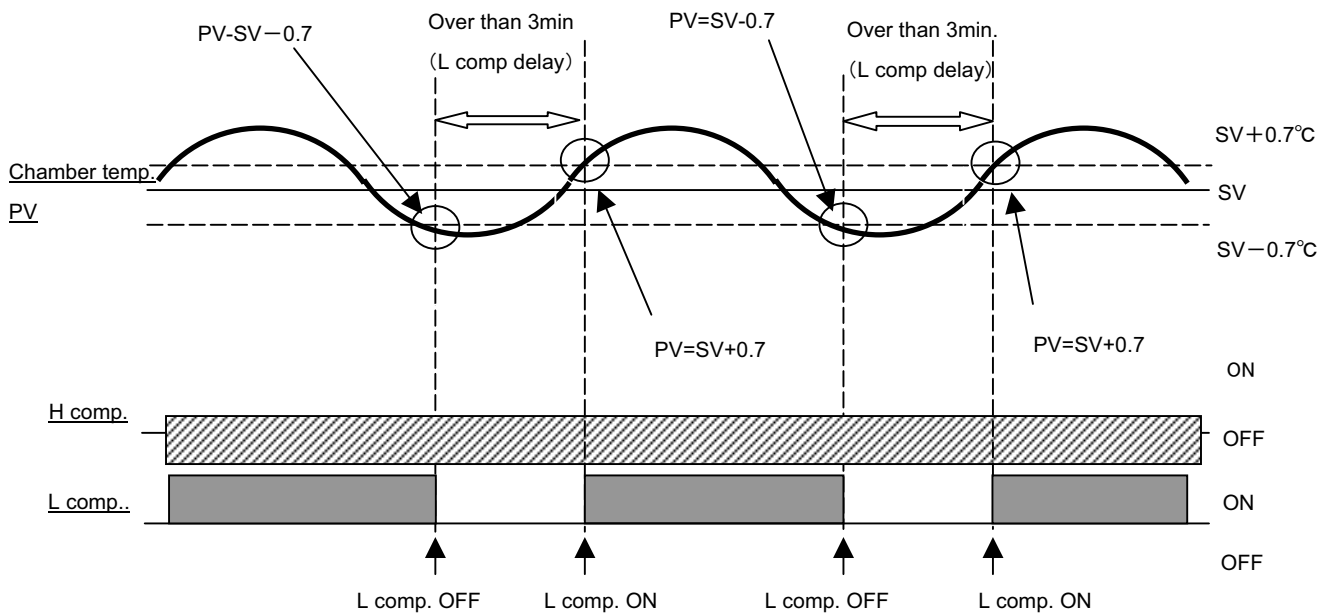
- F25: <Function> Alarm auto recovery time setting
 <Operation> Input F25 and press SET key to display "030" (initial).
 Change to the desired value with  key and  key.
 Press SET key to store the value and revert to chamber temperature display.
- 000: Auto recovery OFF 040: Recovers after 40min. elapse
 010: Recovers after 10min. elapse 050: Recovers after 50min. elapse
 020: Recovers after 20min. elapse 060: Recovers after 60min. elapse
 030: Recovers after 30min. elapse
 (initial)
- F30: <Function> ROM version is displayed
 <Operation> ~~Service code should be input in F06 prior to use this mode.~~
 Input F30 and press SET key to display alternately F30 with
 "1.00" (Version 1.00).
 Press SET key to revert to chamber temperature display.
- F31: <Function> Buzzer setting during filter alarm
 <Operation> Input F31 and press SET key to display "001" (initial).
 Change to the desired value with  key and  key.
 Press SET key to revert to chamber temperature display.
 000: Buzzer OFF
 001: Buzzer ON
- F32: <Function> To display condensing fan motor accumulation time
 <Operation> Input F32 and press SET key to display F32 and '00.0' (e.g.
 Accumulation period should be within 36days) alternately. Press
 SET key to revert to chamber temperature display.
 <Reset> Input '419' in F06 and press SET key to initialize fan motor
 accumulation time. ('00.0' is displayed)
- F50: <Function> To set delay time for temp. alarm
 <Operation> Input F50 and press SET key to display '015' (initial).
 Change to the desired value with  key and  key.
 Press SET key to revert to chamber temperature display.

12. L side compressor operation for temperature control

- (A) L side comp. ON: When chamber temperature is equal to set temperature +0.7°C
 (B) L side comp. OFF: When chamber temperature is equal to set temperature -0.7°C
 (C) Timing of L side comp.
 from OFF to ON: 3 minutes interval

*Note) L side compressor does not turn on unless it meets condition either (A) or (C).

<Compressor operation during cycle>



*Note) When the failure is occurred in the cascade sensor, the Low side compressor should be solely controlled and the High side compressor is forcibly turned on.

Compressor protection:

Both H and L side compressor are turned off to prevent the compressor being warmed up that is caused by the fan motor locked.

Filter sensor temperature:

Both H and L side compressor are turned off when the temperature in filter sensor is equal or higher than 70°C. H side compressor is turned on again when the filter sensor temperature is equal or lower than ambient temperature +10°C.

13. Delay time

L side compressor delay time (Initial: 3 minutes)

When the compressor seizes during cycle operation, Low/High side compressors restarts with the delay time. You can set the desired delay time in F05.

Temperature alarm delay time (Initial: 15 minutes)

When high or low temperature alarm is triggered, buzzer and remote alarm activate with the delay time. You can set delay time in F50.

* Note) ALARM lamp and indication activate without delay.

Door alarm delay time (Initial: 2 minutes)

When the outer door is open, the buzzer activates with the delay time. You can set delay time in F04.

Power failure alarm delay time (3 seconds fixed)

When the power is failed, the power failure alarm activates with 3 seconds of delay. You cannot change the delay time.

14. Sensor offset

Sensor offset value:

- (1) Temperature sensor: $+0.0^{\circ}\text{C}$ (Value is changeable in F07)
- (2) Defrost sensor: $\pm 0.0^{\circ}\text{C}$ (Value is changeable in F08)
- (3) Filter sensor: $\pm 0.0^{\circ}\text{C}$
- (4) AT sensor: $\pm 0.0^{\circ}\text{C}$
- (5) Cascade sensor: $\pm 0.0^{\circ}\text{C}$

15. Remote alarm terminal

Operation:

Once the alarm is triggered, the remote alarm contact (RLY2) switches the position.

	CN3	
	1 – 2 (N.O.)	1 – 3 (N.C.)
Normal	Open	Close
In alarm	Close	Open

16. Power on reset

Setting values after the power is reset:

Alarms: OFF
L/H side compressor: OFF
Remote alarm: OFF
Alarm resume time: 30 minutes
Door alarm delay time: 2 minutes
Counting the period which L side compressor OFF period: Reset
Setting data: Referred to non-volatile memory

Setting values after power retrieves from power failure:

Alarms: OFF
L/H side compressor: OFF
Remote alarm: ON
Door alarm delay time: 2 minutes
Setting data: Refer to non-volatile memory
Counting the period which L side compressor OFF period: Reset
Setting data: Referred to non-volatile memory

17. Other specifications

Lamp operation:

<Control PCB>

- DP1: Orange lamp
Goes off: High/low temp. alarm (with 15min. delay), sensor error, power failure
Lit : Not in alarm condition
- DP2: Green lamp
Goes off: L side compressor turns off. (normal condition)
Lit : L side compressor turns on.
- DP3: Red lamp
Goes off: Heater OFF
Lit : Heater ON
- DP4: Yellow lamp
Goes off: Condensing fan motor OFF
Lit: Condensing fan motor ON

DP6: Green lamp
 Goes off: H side compressor OFF
 Lit : H side compressor ON

<Display PCB>

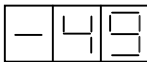
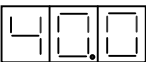
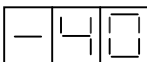
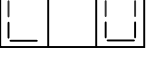
DP51: Red lamp
 Blinks : In alarm condition

DP52: Red lamp
 Lit : Outer door ajar

DP53: Red lamp
 Blinks : In filter alarm

DP54: Green lamp
 Lit : When temperature in AT sensor is equal or lower than 0°C,
 or equal or higher than 35°C.

Examples of display:

Chamber temp.	-49.5°C		Decimal point of chamber temp.	-40.0	
Set temp.	-40.0°C		Sensor offset	-5.0	
Function	F03		Operation monitoring	LCP	
Service code	384		Error	E01	
Set value	004		Battery accumulation	1 year	
Key Lock	L_0		Notice to replace battery (Accumulation is over than 2.8 yrs)		

Buzzer tone:

Alarms (except for door alarm)	Intermittent tone
Key operation	Click tone
Set value memory	Click tone
Unacceptable setting	1 second continuous tone
Door alarm	Intermittent tone with shorter intervals than any other alarms
Filter clogged	Intermittent tone

Parts layout

<Control panel>



<MDF-U443/U442(N)>



<Chamber - upper view>



Condensing fan motor

<Chamber - upper right side>



DEF sensor

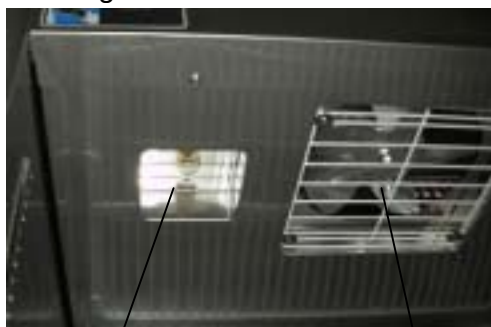
Screw

<Filter cover - lower right side>



※ Loosen screw and remove cover to access the filter.

<Ceiling of chamber>



Lamp

Condensing fan

<Cover removed>



Filter

<Cooling units - Back side>



Compressor L

<Composition of cooling units>



Front

Cascade condenser
AT sensor

<Composition of cooling units>



Back

Cooling fan motor
Compressor H
Compressor L

<Lower back side>



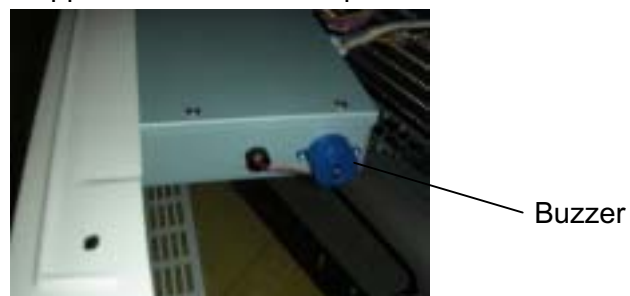
Noise filter

Power cable

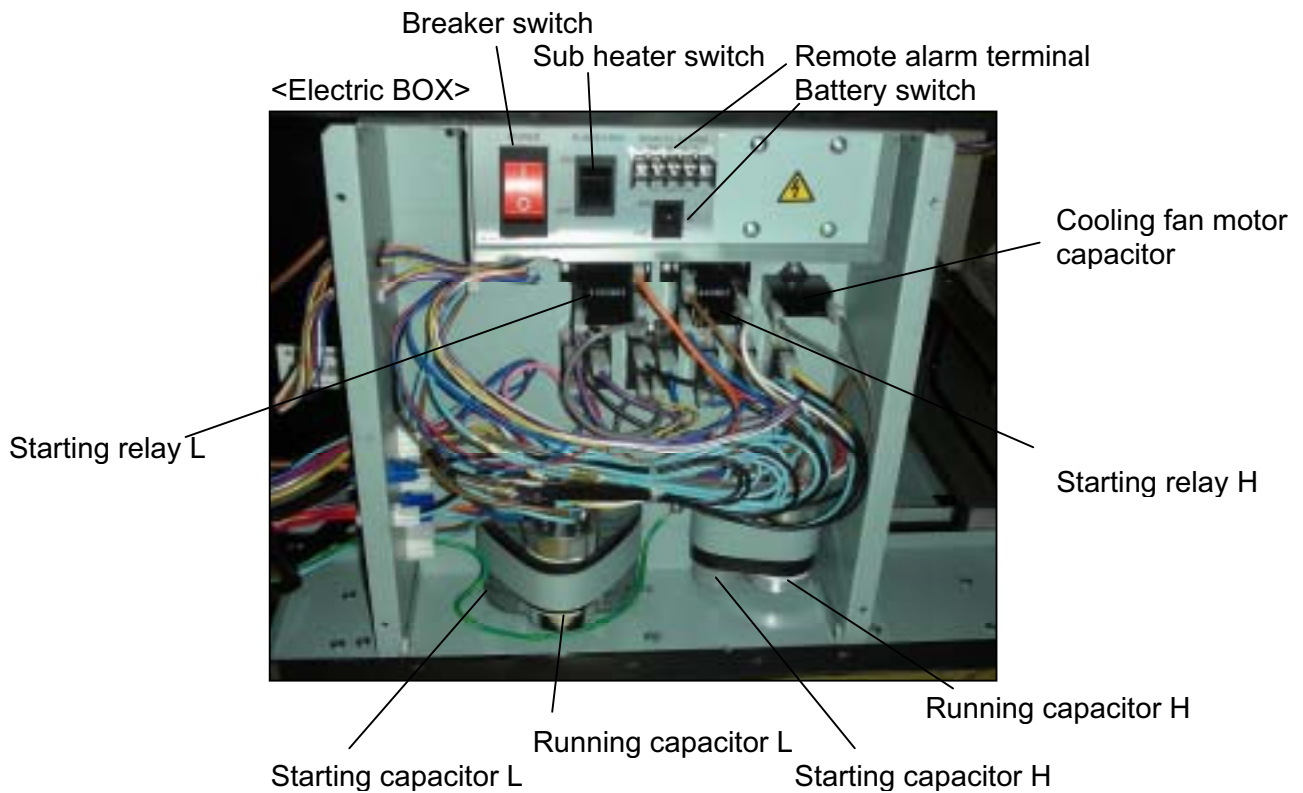
<PCB box - opposite side of control panel>



<Opposite side of control panel>

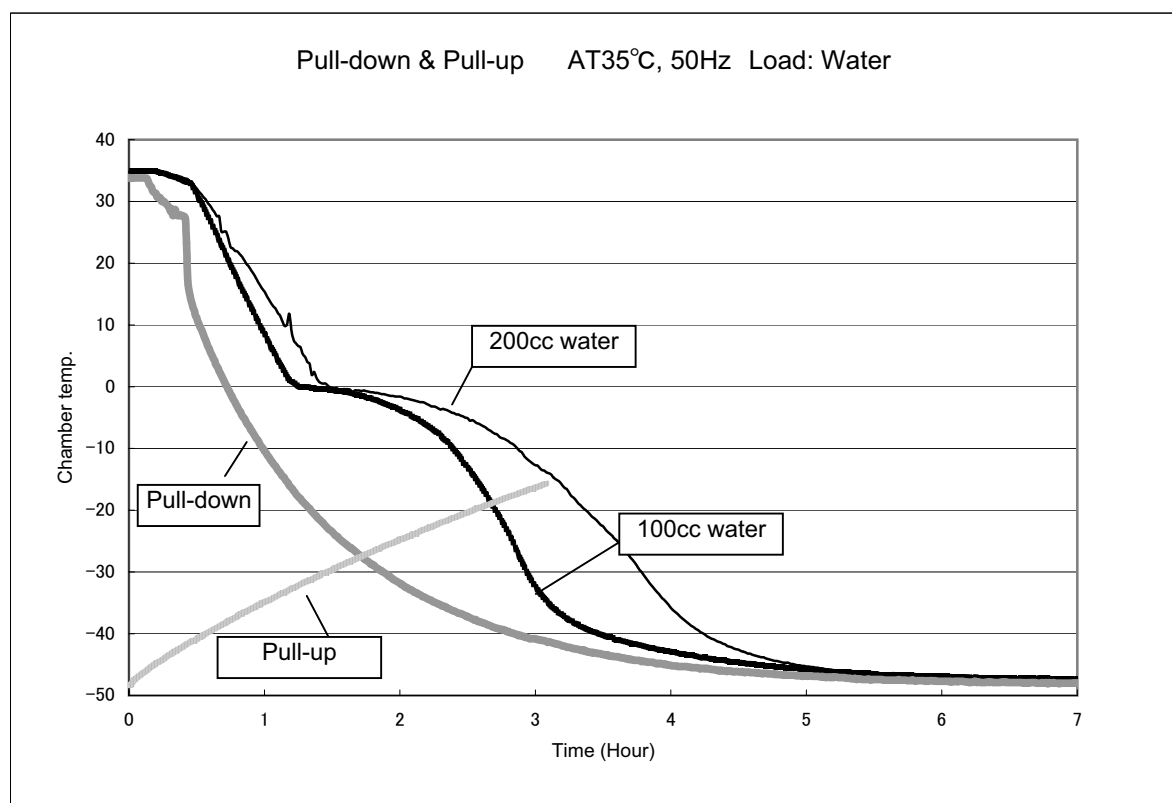
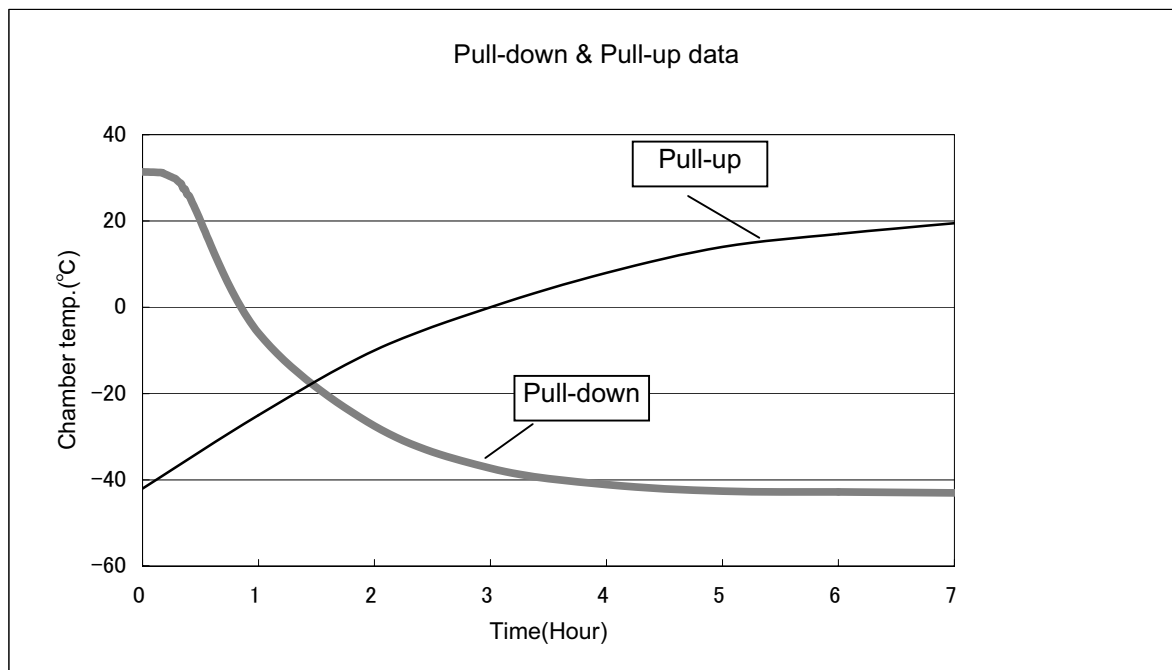


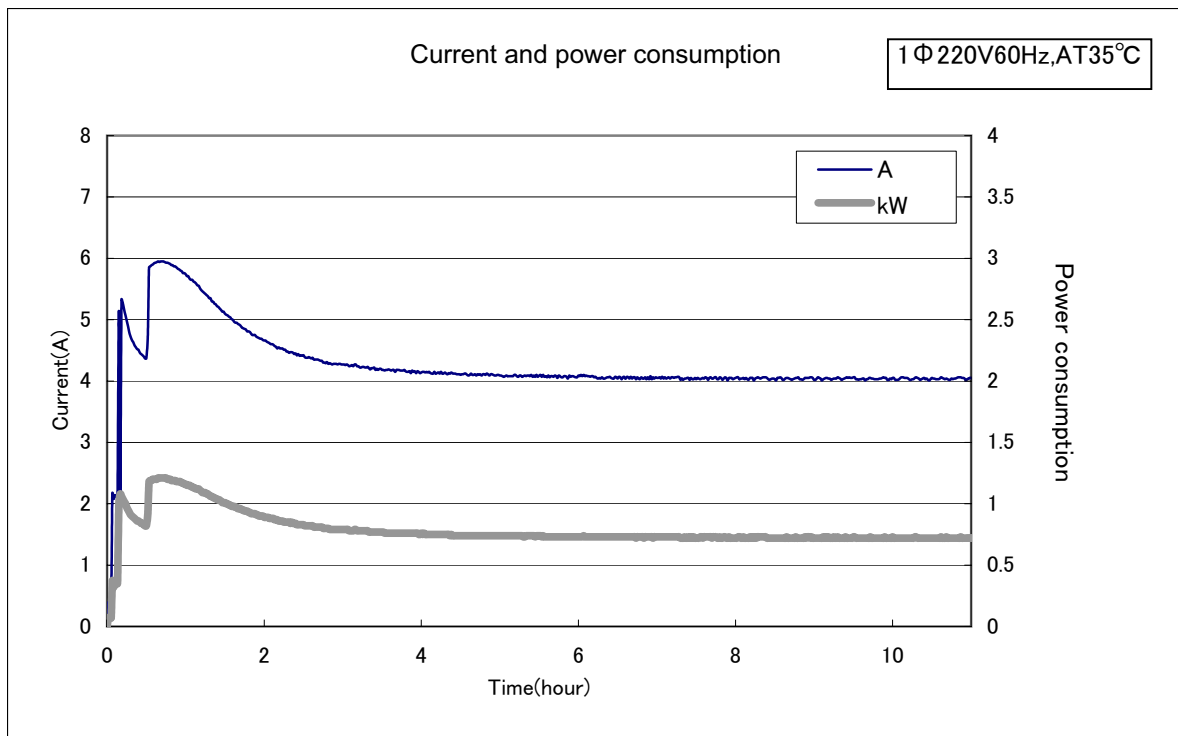
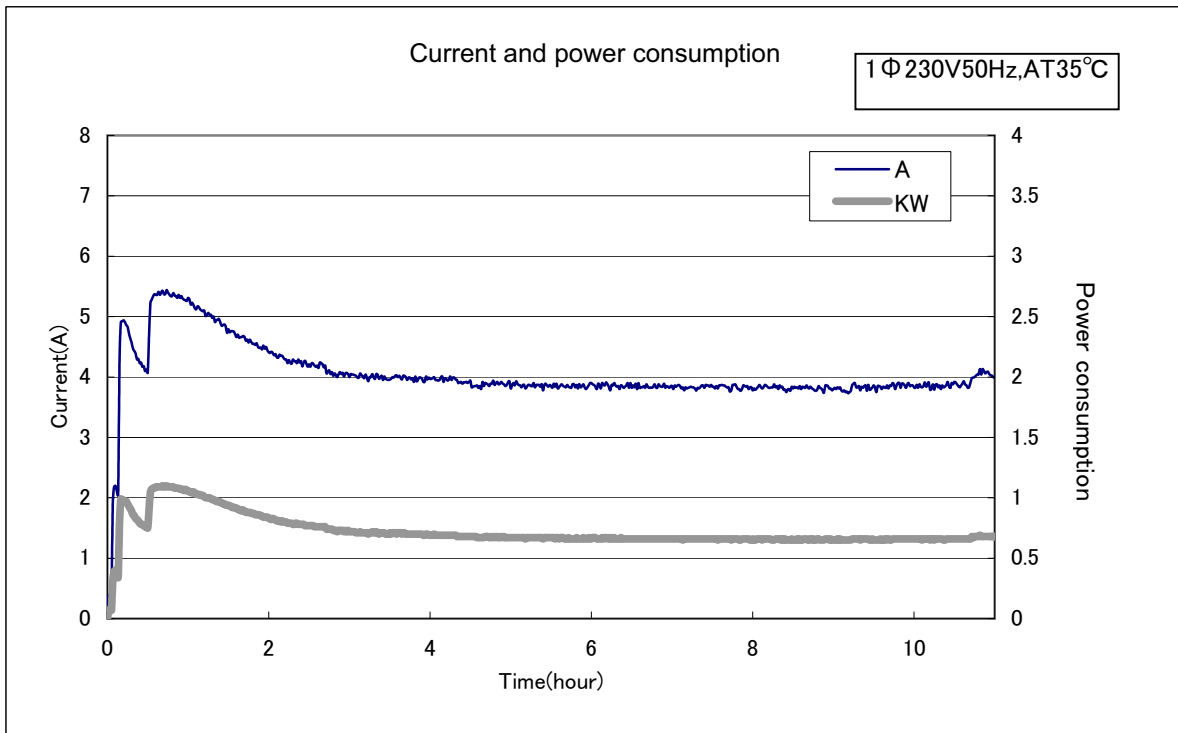
※Buzzer PCB is inside the box.

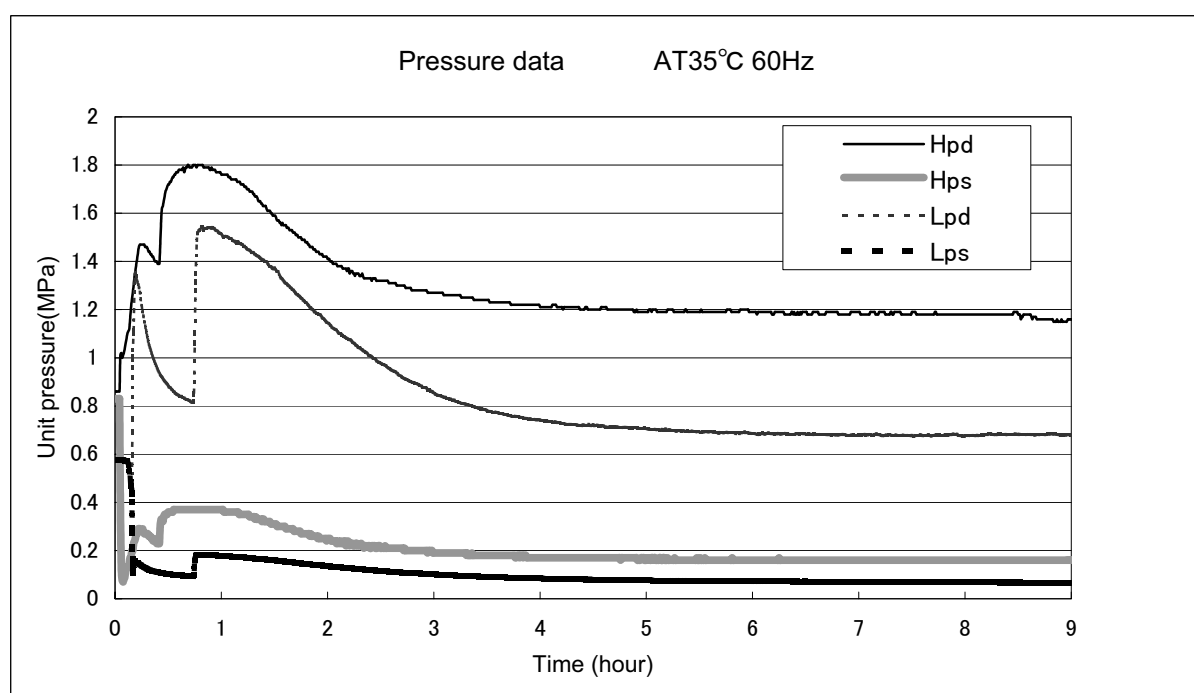
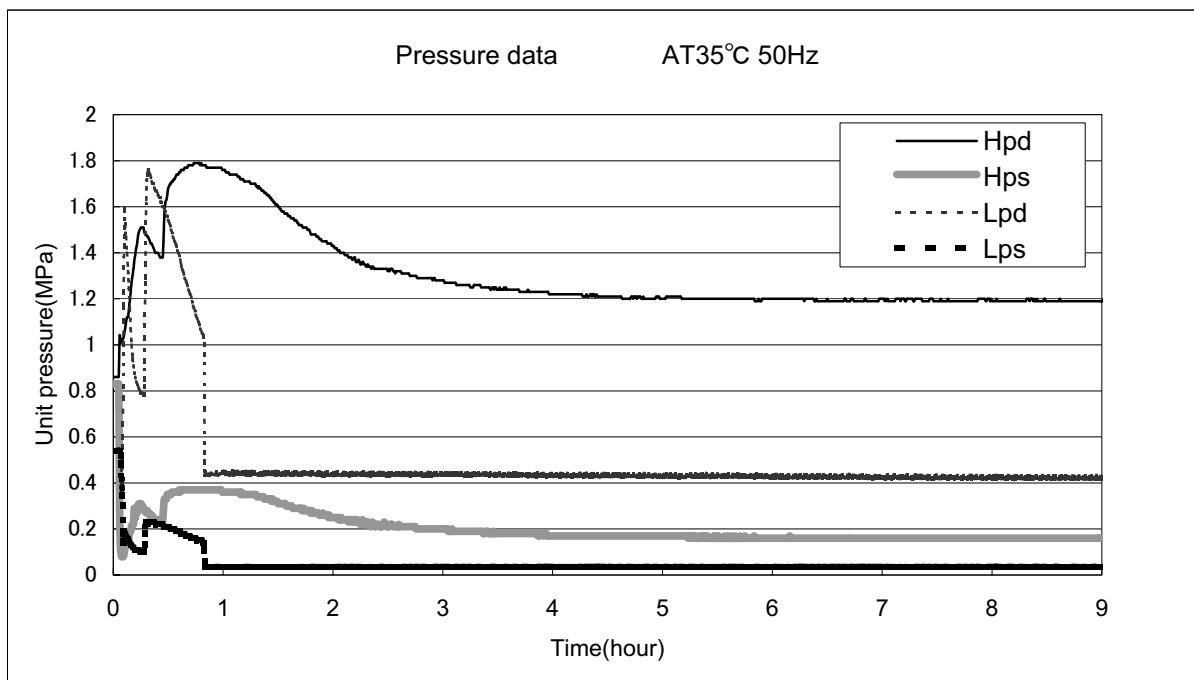


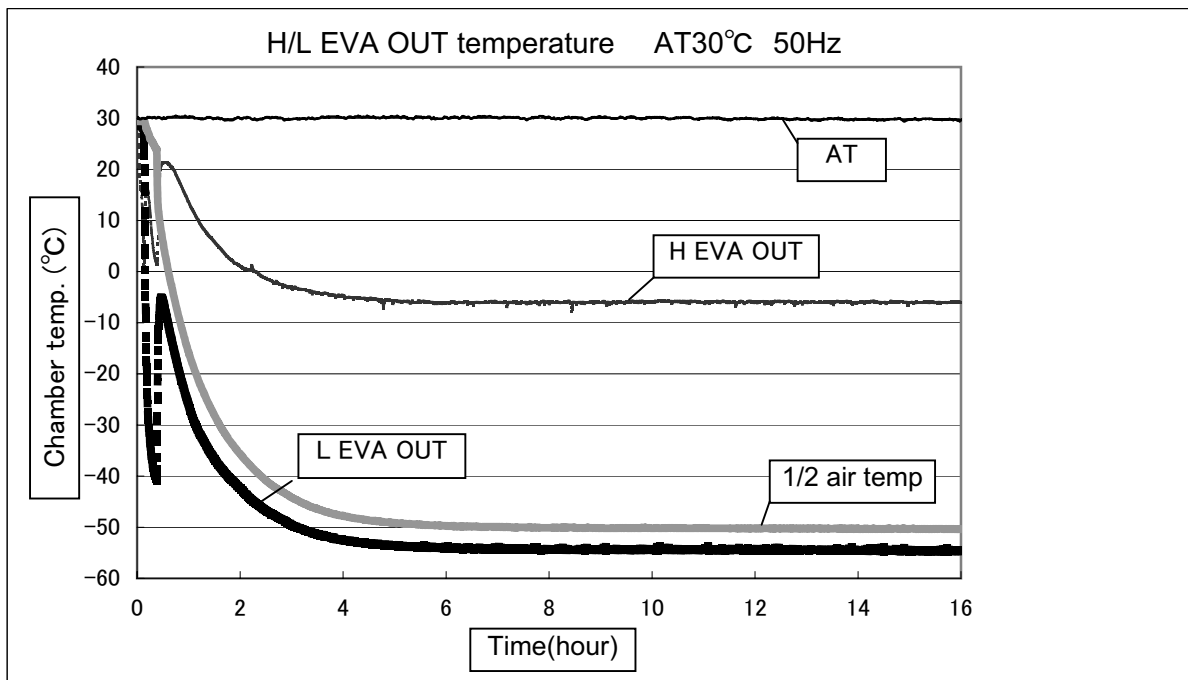
Test data

※Following data are the reference only.









○Power consumption

AT30°C	SV-40°C	SV-20°C
220V/50Hz	13.092	10.3848
230V/50Hz	13.9608	11.5944
220V/60Hz	13.6056	10.9128

(kw/day)

* Reference only

⑩ 10 1/2H Air



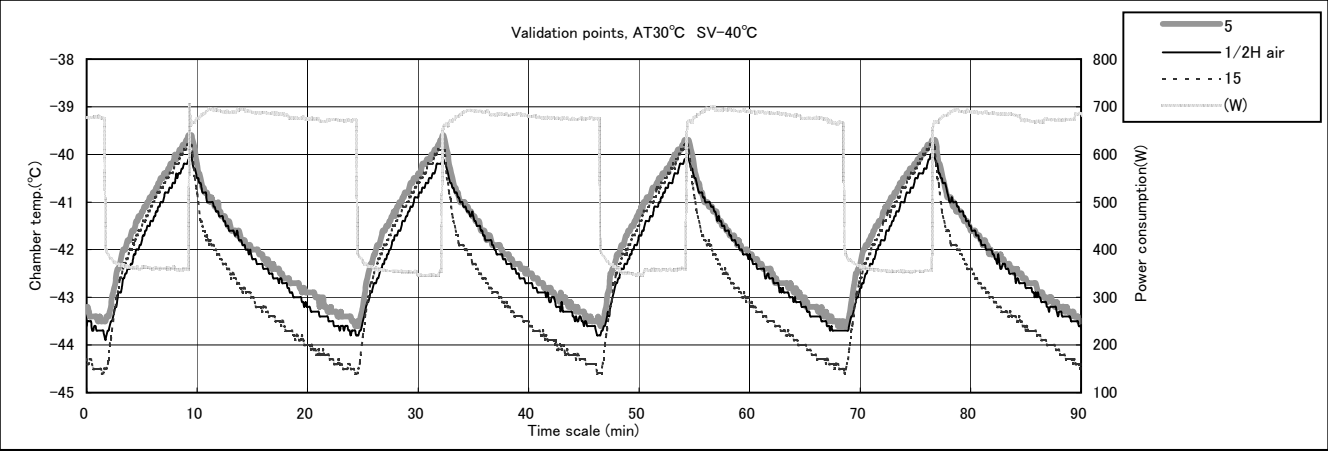
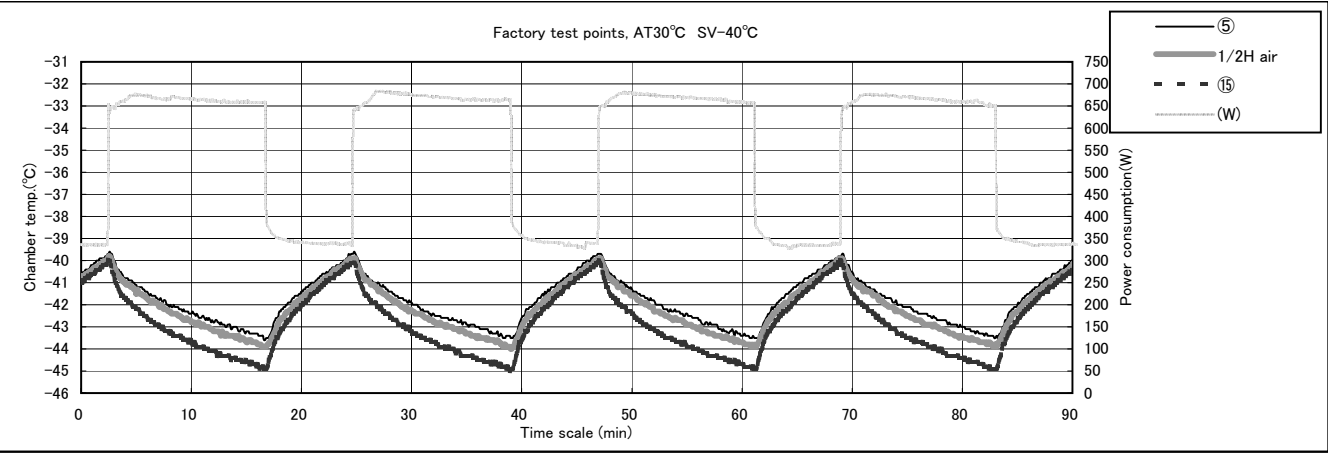
[1] AT30°C, SV-40°C

* Factory test points (°C)

Points	Mid of cycle	Max. P1	Min. P2	Average	Differential
①	-41.2	-39.3	-43.0	-41.3	±1.9
②	-35.6	-34.5	-36.7	-35.6	±1.1
③	-33.8	-32.9	-34.6	-33.7	±0.9
④	-40.9	-32.9	-42.5	-41.0	±1.7
⑤	-41.6	-39.6	-43.6	-41.8	±2.0
⑥	-41.4	-39.6	-43.2	-41.5	±1.8
⑦	-41.7	-39.9	-43.5	-41.9	±1.8
⑧	-41.9	-40.0	-43.8	-42.0	±1.9
⑨	-40.5	-39.2	-41.7	-40.5	±1.3
⑩ 1/2H air	-41.9	-39.8	-44.0	-42.1	±2.1
⑪	-41.6	-39.8	-43.3	-41.6	±1.8
⑫	-41.9	-40.0	-43.7	-42.0	±1.9
⑬	-42.0	-40.2	-43.7	-42.0	±1.8
⑭	-41.3	-39.7	-42.8	-41.3	±1.6
⑮	-42.5	-40.0	-45.0	-42.5	±2.5

* Validation points (°C)

Points	Mid of cycle	Max. P1	Min. P2	Average	Differential
1	-41.2	-39.3	-43.1	-41.5	±1.9
2	-41.3	-39.3	-43.3	-41.6	±2.0
3	-41.7	-39.6	-43.8	-42.0	±2.1
4	-41.3	-39.4	-43.1	-41.4	±1.9
5	-41.6	-39.6	-43.6	-41.9	±2.0
6	-41.7	-39.7	-43.7	-41.9	±2.0
7	-42.0	-39.9	-44.0	-42.2	±2.1
8	-42.2	-40.0	-44.3	-42.4	±2.2
9	-40.3	-39.0	-41.5	-40.3	±1.3
10 1/2h air	-42.0	-40.0	-43.9	-42.1	±2.0
11	-41.9	-39.6	-44.2	-42.3	±2.3
12	-42.1	-39.7	-44.5	-42.5	±2.4
13	-42.1	-39.7	-44.4	-42.4	±2.4
14	-41.1	-39.4	-42.7	-41.2	±1.7
15	-42.2	-39.7	-44.6	-42.6	±2.5



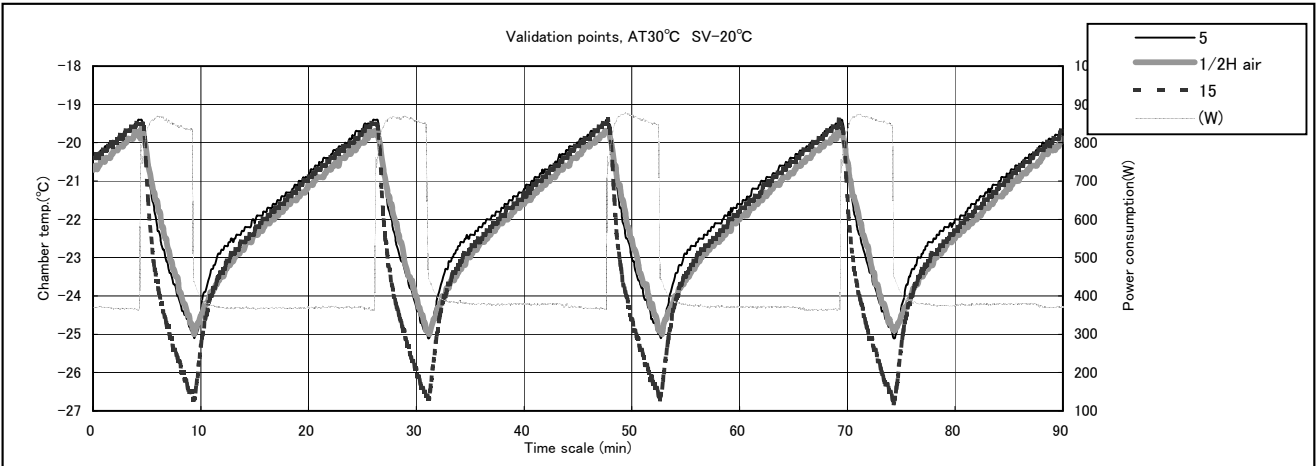
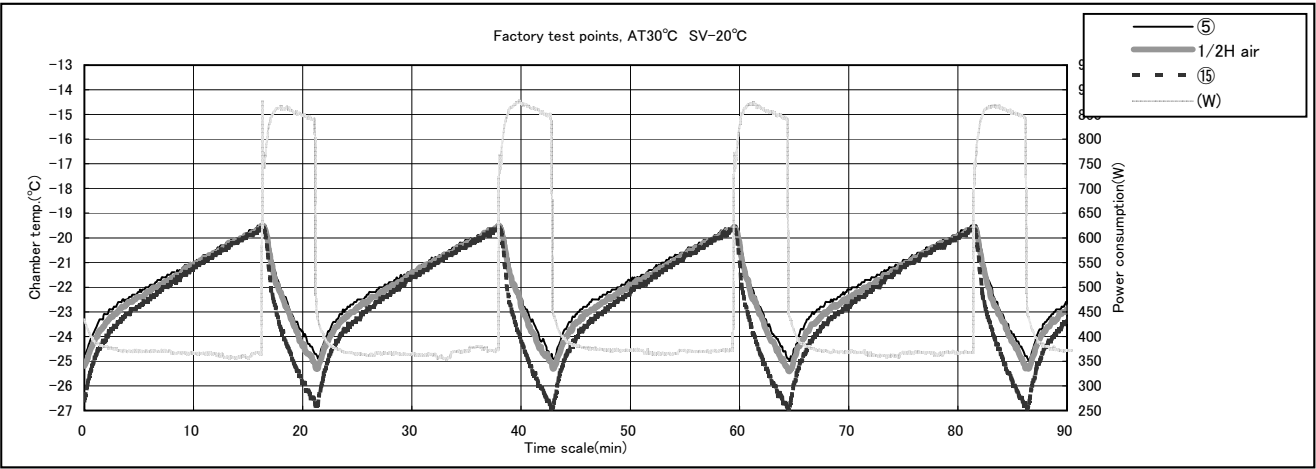
[2] AT30°C, SV-20°C

* Factory test points (°C)

Points	Mid of cycle	Max. P1	Min. P2	Average	Differential
①	-21.2	-18.9	-23.4	-21.0	±2.3
②	-15.7	-14.1	-17.2	-15.5	±1.6
③	-16.6	-15.5	-17.7	-16.7	±1.1
④	-21.6	-19.3	-23.9	-21.4	±2.3
⑤	-22.3	-19.5	-25.0	-21.9	±2.8
⑥	-21.8	-19.3	-24.2	-21.5	±2.5
⑦	-21.9	-19.5	-24.3	-21.7	±2.4
⑧	-22.3	-19.7	-24.8	-22.0	±2.6
⑨	-20.7	-19.2	-22.1	-20.8	±1.5
⑩ 1/2H air	-22.5	-19.5	-25.4	-22.1	±3.0
⑪	-21.5	-19.3	-23.7	-21.4	±2.2
⑫	-22.0	-19.5	-24.4	-21.8	±2.5
⑬	-22.2	-19.7	-24.6	-22.0	±2.5
⑭	-21.8	-19.6	-24.0	-21.7	±2.2
⑮	-23.3	-19.6	-27.0	-22.6	±3.7

* Validation points (°C)

Points	Mid of cycle	Max. P1	Min. P2	Average	Differential
1	-21.3	-18.8	-23.7	-20.9	±2.5
2	-22.0	-19.1	-24.8	-21.4	±2.9
3	-22.4	-19.4	-25.3	-21.8	±3.0
4	-21.7	-19.2	-24.1	-21.3	±2.5
5	-22.3	-19.4	-25.1	-21.7	±2.9
6	-22.2	-19.3	-25.1	-21.7	±2.9
7	-22.2	-19.5	-24.9	-21.8	±2.7
8	-22.8	-19.7	-25.8	-22.1	±3.1
9	-20.6	-19.1	-22.1	-20.6	±1.5
10 1/2H air	-22.3	-19.6	-25.0	-21.9	±2.7
11	-22.6	-19.2	-26.0	-21.8	±3.4
12	-22.8	-19.2	-26.3	-21.9	±3.6
13	-23.0	-19.4	-26.5	-22.1	±3.6
14	-21.5	-19.3	-23.6	-21.3	±2.2
15	-23.1	-19.4	-26.8	-22.2	±3.7



Instruction manual

- This section is extracted and printed from Instruction Manual.
- If you find out “Refer to page ●●” in them, this page means not page in Service manual but page in the lower corner of each page in the extract from Instruction Manual.
This page number is not corresponded with serial number in Service manual.
- **Please note the extracted Instruction Manual which corresponds to the initial unit production, so the contents may be revised in future.**



INSTRUCTION MANUAL

MDF-U443

BIOMEDICAL FREEZER



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INTRODUCTION

- Read this manual carefully before using the appliance and follow the instructions for safety operation.
- Sanyo never guarantee any safety if the appliance is used for any objects other than intended use or used by any procedures other than those mentioned in this manual.
- Keep this manual in an adequate place to refer to it as necessary.
- The contents of the manual will be subjected to change without notice due to the improvement of performance or functions.
- Contact Sanyo sales representative or agent if any page of the manual is lost or page order is incorrect.
- Contact Sanyo sales representative or agent if any point in this manual is unclear or if there are any inaccuracies.
- No part of this manual may be reproduced in any form without the expressed written permission of Sanyo.

PRECAUTIONS FOR SAFE OPERATION

It is imperative that the user complies with this manual as it contains important safety advice.

Items and procedures are described so that you can use this unit correctly and safely. If the precautions advised are followed, this will prevent possible injury to the user and any other person.

Precautions are illustrated in the following way:

WARNING

Failure to observe WARNING signs could result in a hazard to personnel possibly resulting in serious injury or death.

CAUTION

Failure to observe CAUTION signs could result in injury to personnel and damage to the unit and associated property.

Symbol shows;

 this symbol means caution.

 this symbol means an action is prohibited.

 this symbol means an instruction must be followed.

Be sure to keep this manual in a place accessible to users of this unit.

< Label on the unit >



This mark is labeled on the cover in which the electrical components of high voltage are enclosed to prevent the electric shock.

The cover should be removed by a qualified engineer or a service personnel only.

PRECAUTIONS FOR SAFE OPERATION



WARNING

-  **Do not use the unit outdoors.** Current leakage or electric shock may result if the unit is exposed to rain water.
-  **Only qualified engineers or service personnel should install the unit.** The installation by unqualified personnel may cause electric shock or fire.
-  **Install the unit on a sturdy floor and take an adequate precaution to prevent the unit from turning over.** If the floor is not strong enough or the installation site is not adequate, this may result in injury from the unit falling or tipping over.
-  **Never install the unit in a humid place or a place where it is likely to be splashed by water.** Deterioration of the insulation may result which could cause current leakage or electric shock.
-  **Never install the unit in a flammable or volatile location.** This may cause explosion or fire.
-  **Never install the unit where acid or corrosive gases are present** as current leakage or electric shock may result due to corrosion.
-  **Always ground (earth) the unit to prevent electric shock.** If the power supply outlet is not grounded, it will be necessary to install a ground by qualified engineers.
-  **Never ground the unit through a gas pipe, water main, telephone line or lightning rod.** Such grounding may cause electric shock in the case of an incomplete circuit.
-  **Connect the unit to a power source as indicated on the rating label attached to the unit.** Use of any other voltage or frequency other than that on the rating label may cause fire or electric shock.
-  **Never store volatile or flammable substances** in this unit if the container cannot be sealed. These may cause explosion or fire.
-  **Do not insert metal objects such as a pin or a wire into any vent, gap or any outlet on the unit.** This may cause electric shock or injury by accidental contact with moving parts.
-  **Use this unit in safe area when treating the poison, harmful or radiate articles.** Improper use may cause bad effect on your health or environment.
-  **Turn off the power switch (if provided) and disconnect the power supply to the unit prior to any repair or maintenance** of the unit in order to prevent electric shock or injury.
-  **Do not touch any electrical parts (such as power supply plug) or operate switches with a wet hand.** This may cause electric shock.

PRECAUTIONS FOR SAFE OPERATION

WARNING

-  **Ensure you do not inhale or consume medication or aerosols** from around the unit at the time of maintenance. These may be harmful to your health.
-  **Never splash water directly onto the unit** as this may cause electric shock or short circuit.
-  **Never put containers with liquid on the unit** as this may cause electric shock or short circuit when the liquid is spilled.
-  **Never bind, process, or step on the power supply cord, or never damage or break the power supply plug.** A broken supply cord or plug may cause fire or electric shock.
-  **Do not use the supply cord if its plug is loose.** Such supply cord may cause fire or electric shock.
-  **Never disassemble, repair, or modify the unit yourself.** Any such work carried out by an unauthorized person may result in fire, or electric shock or injury due to a malfunction.
-  **Disconnect the power supply plug if there is something wrong with the unit.** Continued abnormal operation may cause electric shock or fire.
-  **When removing the plug from the power supply outlet, grip the power supply plug, not the cord.** Pulling the cord may result in electric shock or fire by short circuit.
-  **Disconnect the power supply plug** before moving the unit. Take care not to damage the power cord. A damaged cord may cause electric shock or fire.
-  **Disconnect the power plug when the unit is not used for long periods.** Keeping the connection may cause electric shock, current leakage, or fire due to the deterioration of insulation.
-  **If the unit is to be stored unused in an unsupervised area for an extended period, ensure that children do not have access and that doors cannot be closed completely.**
-  **The disposal of the unit should be accomplished by appropriate personnel.** Remove doors to prevent accidents such as suffocation.
-  **Do not put the packing plastic bag within reach of children** as suffocation may result.

PRECAUTIONS FOR SAFE OPERATION

CAUTION

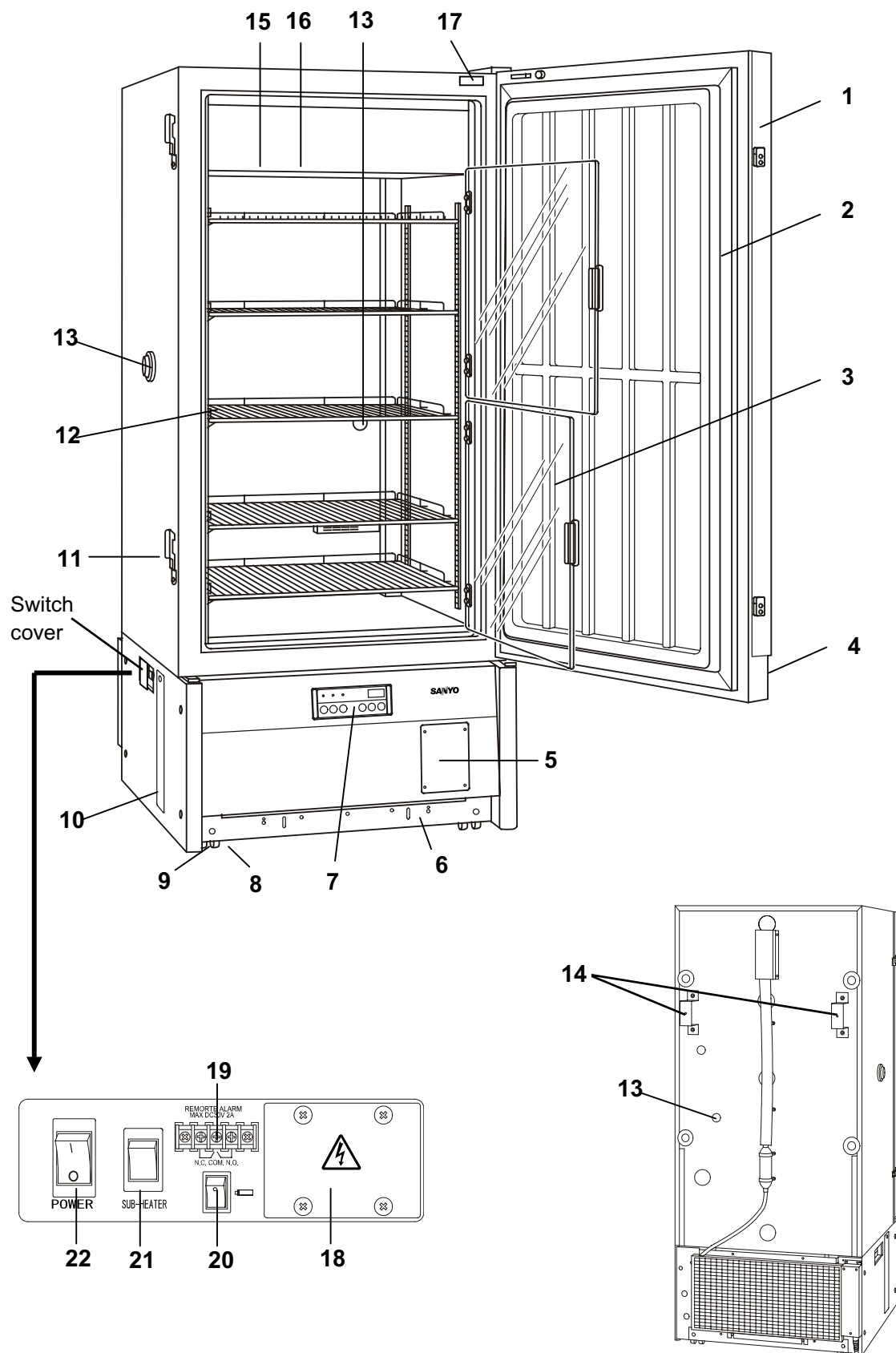
-  **Use a dedicated power source** (a dedicated circuit with a breaker) as indicated on the rating label attached to the unit. A branched circuit may cause fire resulting from abnormal heating.
-  **Connect the power supply plug to the power source firmly after removing the dust on the plug.** A dusty plug or improper insertion may cause a heat or ignition.
-  **Never store corrosive substances such as acid or alkali** in this unit if the container cannot be sealed. These may cause corrosion of inner components or electric parts.
-  **Check the setting when starting up of operation after power failure or turning off of power switch.** The stored items may be damaged due to the change of setting.
-  **Be careful not to tip over the unit** during movement to prevent damage or injury.
-  **Prepare a safety check sheet** when you request any repair or maintenance for the safety of service personnel.

ENVIRONMENTAL CONDITIONS

This equipment is designed to be safe at least under the following conditions (based on the IEC 61010-1):

1. Indoor use;
2. Altitude up to 2000 m;
3. Ambient temperature 5°C to 40°C
4. Maximum relative humidity 80% for temperature up to 31°C decreasing linearly to 50% relative humidity at 40°C;
5. Mains supply voltage fluctuations not to exceed $\pm 10\%$ of the nominal voltage;
6. Other supply voltage fluctuations as stated by the manufacture;
7. Transient overvoltages according to Installation Categories (Overvoltage Categories) II; For mains supply the minimum and normal category is II;
8. Pollution degree 2 in accordance with IEC 60664.

FREEZER COMPONENTS



FREEZER COMPONENTS

1. Door: To open the door, grip the handle.

2. Door gasket: This provides a tight door seal and prevents cold air leakage. Keep clean.

3. Inner door: Transparent acrylic plate minimizes cold air leakage.

4. Lock: Turn clockwise to 180° with a key and the outer door is securely locked.

5. Space for temperature recorder: Refer to page 37 for installation.

6. Evaporating tray: Defrost water from the evaporator accumulates on the tray and evaporates into the atmosphere. See page 23 for cleaning.

7. Control panel: See page 10 for the details.

8. Leveling foot: Two feet are provided on the front side (right and left). Keep the unit in level by adjusting these feet at the installation. See page 12.

9. Caster: Four casters are provided to facilitate moving of the cabinet.

10. Condenser filter (inside): Clean a clogged condenser filter. See page 24 for the details.

11. Latch: This firmly latches the door to the freezer frame and prevents cold air leakage.

12. Shelf: Shelf location can be freely adjusted to match size of stored items.

13. Access port (left side, rear side): This is used for leading the measuring cable from the chamber to the outside.

14. Fixture (rear side):

15. Lamp: Lights up when door is open.

16. Circulating fan (inside): Sucks in cold air that has been circulating in the chamber and sends it out for further circulation after re-cooling it.

17. Door switch: Stops the circulating fan when the door is open to prevent cold air leakage. Also activates the door lamp.

18. Communication box cover:

19. Remote alarm terminal: This is used to notice an alarm condition of the unit to remote location. Refer to page 21 "Remote alarm terminal".

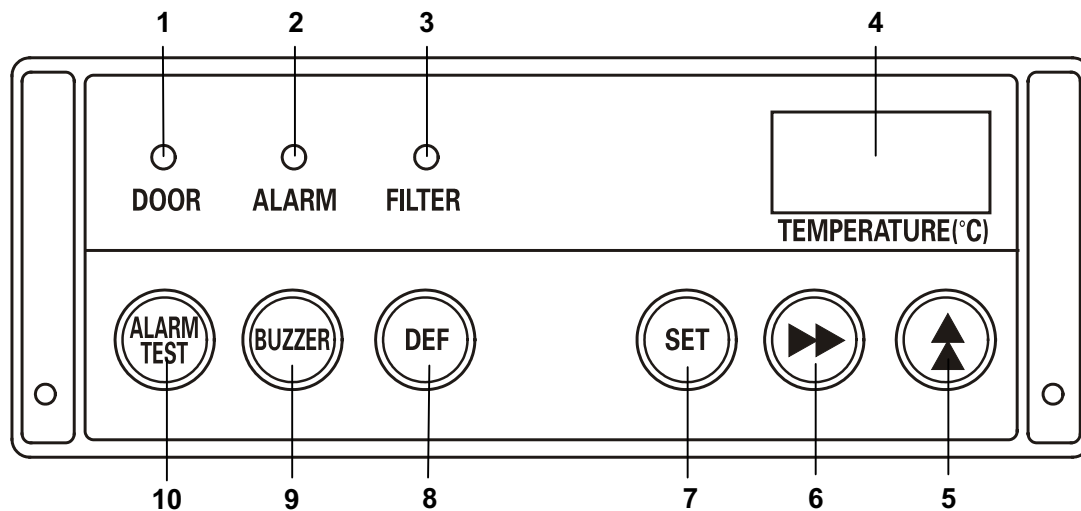
20. Battery switch (): This is a switch for power failure alarm. Be sure to turn off this switch to save the battery if the freezer is not in operation for long period. After installation, turn on the power switch and battery switch.

21. Sub-heater switch: Normally, turn this switch ON. Refer to page 20.

22. Power switch: This is for turning ON/OFF the power to the unit. ON – "I" OFF – "O"
The switch is covered by a switch cover to prevent the accidental push. To turn on or off the switch, remove the switch cover by loosening the screw.

FREEZER COMPONENTS

Control panel



1. Door lamp (DOOR): This indicator lights when the door is open.

2. Alarm lamp (ALARM): This lamp is flashed at the time of power failure or in the event of alarm.

3. Filter check lamp (FILTER): This lamp blinks when the condenser filter is clogged. Clean the condenser filter according to page 24.

4. Digital temperature indicator: This indicator shows the current chamber temperature or set temperature. And error code is also indicated in the event of alarm.

5. Numerical value shift key (▲): Pressing this key in the setting mode causes the numerical value to shift.

6. Digit shift key (▶▶): Pressing this key in the setting mode causes the changeable digit to shift. Key lock mode is led by pressing this key for more than 5 seconds in the temperature display mode. Refer to page 14 for the key lock function.

7. Set key (SET): Chamber temperature setting mode is led by pressing this key. The changeable digit is flashed. Pressing this key again after temperature setting memorizes the setting.

8. Defrost key (DEF): Manual defrosting is available by pressing this key for about 5 seconds in addition to the automatic defrosting. As for the details, see page 20.

NOTE: A defrost key (DEF) doesn't work during the warming up of the product. (Con and chamber temperature are displayed alternately.)

9. Alarm buzzer stop key (BUZZER): Press this key to silence the buzzer in the event that the alarm operates and the buzzer sounds. The alarm buzzer sounds again with delay time when the same alarm status continues (refer to page 17).

10. Alarm test key (ALARM TEST): To check the alarm system during biomedical freezer operation. Pressing this key with the battery switch ON gets the alarm lamp to flash, the remote alarm to operate, and the buzzer to sound. Refer to page 17.

INSTALLATION SITE

To operate this unit properly and to obtain maximum performance, install the unit in a location with the following conditions:

■ **A location not subjected to direct sunlight**

Do not install the unit under direct sunlight. Installation in a location subjected to direct sunlight cannot obtain the intended performance.

■ **A location with adequate ventilation**

Leave at least 10 cm around the unit for ventilation. Poor ventilation will result in a reduction of the performance and consequently the failure.

■ **A location away from heat generating sources**

Avoid installing the unit near heat-emitting appliances such as a heater or a boiler etc. Heat can decrease the intended performance of the unit.

■ **A location with little temperature change**

Install the unit under stable ambient temperature. The allowable ambient temperature is between -5 and +35°C.

■ **A location with a sturdy and level floor**

Always install the unit on a sturdy and level floor. The uneven floor or tilted installation may cause failure or injury. Install the unit in stable condition to avoid the vibration or noise. Unstable condition may cause vibration or noise.

 WARNING

Install the unit on a sturdy floor. If the floor is not strong enough or the installation site is not adequate, this may result in injury from the unit falling or tipping over.

Select a level and sturdy floor for installation. This precaution will prevent the unit from tipping. Improper installation may result in water spillage or injury from the unit tipping over.

■ **A location not prone to high humidity**

Install the unit in the ambient of 80% R.H. or less humidity. Installation under high humidity may cause current leakage or electric shock.

 WARNING

Do not use the unit outdoors. Current leakage or electric shock may result if the unit is exposed to rain water.

Never install the unit in a humid place or a place where it is likely to be splashed by water. Deterioration of the insulation may result which could cause current leakage or electric shock.

■ **A location without flammable or corrosive gas**

Never install the unit in a flammable or volatile location. This may cause explosion or fire or may result in the current leakage or electric shock by the corrosion of the electrical components.

■ **A location without the possibility of anything fall**

Avoid installing the unit in the location where anything can fall down onto the unit. This may cause the breakdown or failure of the unit.

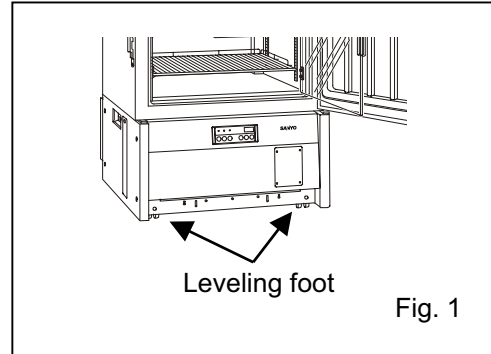
INSTALLATION

1. Removing the packaging materials and tapes

Remove all transportation packaging materials and tapes. Open the doors and ventilate the unit. If the outside panels are dirty, clean them with a diluted neutral dishwashing detergent. (Undiluted detergent can damage the plastic components. For the dilution, refer to the instruction of the detergent.) After the cleaning with the diluted detergent, always wipe it off with a wet cloth. Then wipe off the panels with a dry cloth.

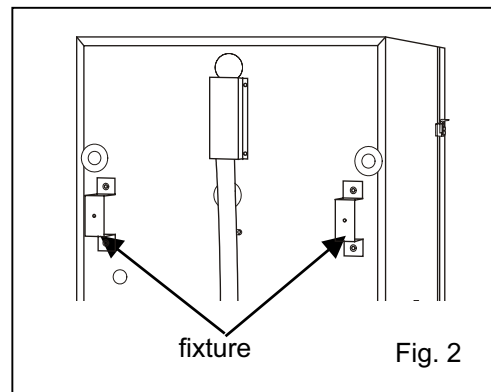
2. Adjusting the leveling foot

Extend the leveling feet by rotating them counterclockwise to contact them to the floor. Ensure the unit is level. (Fig. 1)



3. Fixing the unit

Two fixtures are attached to the rear of the frame. (Fig. 2) Fix the frame to the wall with these fixtures and rope or chain.



4. Ground (earth)

The ground (earth) is for preventing the electric shock in the case of the electrical insulation is somehow degraded. Always ground the unit at the time of installation.

WARNING

Use a power supply outlet with ground (earth) to prevent electric shock. If the power supply outlet is not grounded, it is necessary to install a ground by qualified engineers.

Never ground the unit through a gas pipe, water main, telephone line or lightning rod. Such grounding may cause electric shock in the case of an incomplete circuit.

START-UP OF UNIT

Follow the procedures for the initial and consequent operations of the unit.

1. Check the power switch is off, battery switch is off and sub-heater switch is off.
2. Connect the power cord to the dedicated outlet with appropriate rating. Then turn on the power switch.
3. Turn on the battery switch.

Note:

The battery needs to be replaced about every 3 years. Contact Sanyo sales representative or agent for battery replacement.

4. The alarm buzzer sometimes operates. In this case, stop the buzzer by pressing the alarm buzzer stop key (BUZZER).
5. Set the chamber temperature to the desired temperature.
6. Allow the chamber temperature to fall to the desired temperature. Check the chamber temperature on the digital temperature indicator.
7. Press the alarm test key (ALARM TEST) and check that the alarm lamp blinks and alarm buzzer activates.
8. Begin slowly placing items into the chamber to minimize the temperature rise.

 CAUTION

Do not put too many warm articles into a freezer compartment before enough operating. Put items in a few at a time after the freezer compartment temperature has cooled to at least -20°C.

Start-up of unit:

The unit is programmed to repeatedly turn the compressor on and off in order to make its startability better when you start the unit at low ambient temperature (about 25°C or lower). However, the unit would start the operation without turning the compressor on and off repeatedly when you install the cooled unit at high ambient temperature and it causes the unit would have the starting current running with longer time.

The unit should be exposed to ambient temperature sufficiently, 4 hours at least to avoid the breaker from trapping.

Operation after power failure

The memory (chamber temperature setting and alarm temperature setting) is backed-up by nonvolatile memory. Accordingly, the freezer resumes the operation with setting before power failure.

 CAUTION

The start-up after power failure is subject to adverse affection such as voltage drop because all electrical appliance start to operate simultaneously. Always check the running status.

CHAMBER TEMPERATURE SETTING

Table 1 shows the basic procedure for setting the chamber temperature. Perform key operations in the sequence indicated in the table. The example in the table is based on the assumption that the desired temperature is -25°C. The chamber temperature is set to -40°C at the factory.

Table 1 Basic operation sequence (Example: Chamber temperature -25°C)

	Description of operation	Key operated	Indication after operation
1	Switch ON the freezer.	----	The current chamber temperature is displayed.
2	Press set key.	SET	The second digit is flashed.
3	Set the temperature to -25 with the digit shift key and the numerical value shift key.	▶▶	When pressed, the settable digit moves.
		▲	When pressed, the figure of settable digit increases.
4	Press set key.	SET	Set temperature is memorized and the current chamber temperature is displayed.

Note:

- Although the range of the chamber temperature setting is between -15°C and -44°C, the guaranteed chamber temperature without load is -40°C when the ambient temperature is 35°C.
- The set mode returns to the temperature display mode automatically when 90 seconds has passed without any key operation. In this case, any setting before pressing set key (SET) is not memorized.

KEY LOCK FUNCTION

This unit is provided with the key lock function. When the key lock is ON, change of the setting through the key pad is not available. The key lock is set in OFF at the factory.

Display	Mode	Function
L 0	Key lock is OFF	Enable to change of the setting
L 1	Key lock is ON	Disable to change of the setting

Table 2 Procedure for key lock setting (change from key lock OFF to key lock ON)

	Description of operation	Key operated	Indication after operation
1	Press digit shift key for 5 seconds.	▶▶	The first digit is flashed.
2	Press numerical value shift key and scroll the figure to 1.	▲	When pressed, the figure of settable digit increases.
3	Press set key.	SET	The key lock is set to ON. The current chamber temperature is displayed.

Note:

- The key lock works for the chamber temperature setting and function mode.
- To release the key lock, select L0 when performing the key lock mode operation described above.
- The set mode returns to the temperature display mode automatically when 90 seconds has passed without any key operation. In this case, any setting before pressing set key (SET) is not memorized.

FUNCTION MODE

This unit has the following function mode.

Indication	Mode	Settable range
F01	Setting of high temperature alarm	Between 5 and 20°C higher than the chamber set temperature (1°C gradient)
F02	Setting of low temperature alarm	Between -5 and -20°C lower than the chamber set temperature (1°C gradient)
F04	Setting of delay time of door alarm	Between 1 and 15 minutes (1 minute gradient)
F05	Setting of compressor delay time (for low stage side only)	Between 2 and 15 minutes (1 minute gradient)
F25	Setting of alarm resume time	000 or between 10 and 60 minutes (10-minute gradient)
F50	Setting of alarm delay time	Between 0 and 15 minutes (1 minute gradient)

SETTING OF ALARM DELAY TIME

The delay time of the buzzer and remote alarm for high and low temperature alarm can be set between 0 and 15 minutes. The procedure in table 3 shows the sequence to set the delay time to 10 minutes. The delay time is set to 15 minutes at the factory.

Table 3 Setting procedure for alarm delay time (change from 15 minutes to 10 minutes)

	Description of operation	Key operated	Indication after operation
1		----	The current chamber temperature is displayed.
2	Press numerical value shift key for 5 seconds.		The first digit is flashed.
3	Scroll the figure to F50 by using digit shift key and numerical value shift key		When pressed, the figure of settable digit changes.
			When pressed, the changeable digit moves.
4	Press set key.	SET	The current delay time is displayed. The first digit is flashed.
5	Set the figure to 010 with the numerical value shift key.		When pressed, the figure of the first digit changes.
6	Press set key.	SET	The delay time is memorized and the current chamber temperature is displayed.

- The set mode returns to the temperature display mode automatically when 90 seconds has passed without any key operation. In this case, any setting before pressing set key (SET) is not memorized.

SETTING OF TEMPERATURE ALARM

This unit is provided with the high and low temperature alarm and the temperature at which the alarm is activated is changeable.

The following procedure shows the setting of alarm temperature according to the condition below:

High temperature alarm: activates at the temperature 10°C higher than the set temperature

Low temperature alarm: activates at the temperature -10°C lower than the set temperature

Note:

The alarm temperature is set at the factory 15°C higher and lower than the set temperature.

The available range of alarm temperature is between 5°C and 20°C higher or lower than the set temperature.

Table 4. Procedure for setting high temperature alarm (Change from 15°C to 5°C)

	Description of operation	Key operated	Indication after operation
1		----	The current chamber temperature is displayed.
2	Press numerical value shift key for about 5 seconds.		The first digit is flashed.
3	Press numerical value shift key and scroll the figure to 1.		The first digit is flashed.
4	Press set key.	SET	The current setting is displayed.
5	Scroll the figure to 010 by using the digit shift key and the numerical value shift key		When pressed, the figure of settable digit changes.
			When pressed, the changeable digit moves.
6	Press set key.	SET	Alarm temperature is memorized and the current chamber temperature is displayed.

Table 5. Procedure for setting low temperature alarm (Change from -15°C to -10°C)

	Description of operation	Key operated	Indication after operation
1		----	The current chamber temperature is displayed.
2	Press numerical value shift key for about 5 seconds.		The first digit is flashed.
3	Press numerical value shift key and scroll the figure to 2..		The first digit is flashed.
4	Press set key.	SET	The current setting is displayed.
5	Scroll the figure to -10 by using the digit shift key and the numerical value shift key		When pressed, the figure of settable digit changes.
			When pressed, the changeable digit moves.
6	Press set key.	SET	Alarm temperature is memorized and the current chamber temperature is displayed.

■ The set mode returns to the temperature display mode automatically when 90 seconds has passed without any key operation. In this case, any setting before pressing set key (SET) is not memorized.

SETTING OF ALARM RESUME TIME

The alarm buzzer is silenced by pressing alarm buzzer stop key (BUZZER) on the control panel during alarm condition.(The remote alarm sound and lamp are not silenced.)

The buzzer will be activated again after certain suspension if the alarm condition is continued. The suspension time can be set by following the procedure shown in the Table 5 below.

The example in the table is based on the assumption that the desired duration is 20 minutes. The duration is set to 30 minutes at the factory.

Table 6 Setting procedure for alarm resume time (change from 30 minutes to 20 minutes)

	Description of operation	Key operated	Indication after operation
1		----	The current chamber temperature is displayed.
2	Press numerical value shift key for 5 seconds.		The first digit is flashed.
3	Set the figure to F25 with the numerical value shift key and the digit shift key.		When pressed, the figure of settable digit changes.
			When pressed, the figure of settable digit changes.
4	Press set key.	SET	The current setting is displayed. The second digit is flashed.
5	Set the figure to 020 with the numerical value shift key.		When pressed, the figure of settable digit changes.
6	Press set key.	SET	The setting is memorized and the current chamber temperature is displayed.

- The settable alarm resume time is 10, 20, 30, 40, 50, or 60 minutes (The setting is 010, 020, 030, 040, 050, or 060). The buzzer would not reset if the resume time is set in 000.
- It is recommended to set the alarm resume time when the freezer is not under alarm condition. The setting during alarm condition is effective on the next alarm condition.
- The setting cannot be changed during power failure.
- The set mode returns to the temperature display mode automatically when 90 seconds has passed without any key operation. In this case, any setting before pressing set key (SET) is not memorized.
- The setting of alarm resume time is invalid when the delay time for high and low temperature alarm is set to 0.

SETTING OF DOOR ALARM DELAY TIME

The buzzer of door alarm is activated with 2 minutes delay when the door is open. The delay time is changeable.

Follow the procedure in table 8 below to change the setting of delay time. The procedure assumes that the delay time is changed from 2 minutes to 3 minutes.

(The delay time is set in 2 minutes at the factory.)

Table 8. Changing procedure for delay time (change from 2 minutes to 3 minutes)

	Description of operation	Key operated	Indication after operation
1		----	The current chamber temperature is displayed.
2	Press numerical value shift key for 5 seconds.		The first digit is flashed.
3	Set the figure to F04 with the numerical value shift key.		When pressed, the figure of settable digit changes.
4	Press set key.	SET	The current delay time is displayed. The first digit is flashed.
5	Set the figure to 003 with the numerical value shift key.		When pressed, the figure of the first digit changes.
6	Press set key.	SET	The delay time is memorized and the current chamber temperature is displayed.

Note:

- The setting range for delay time is between 1 and 15 minutes.
- The set mode returns to the temperature display mode automatically when 90 seconds has passed without any key operation. In this case, any setting before pressing set key (SET) is not memorized.

SETTING OF COMPRESSOR DELAY TIME

The delay time of low stage side compressor can be set to reduce the load on the power line and to facilitate the start-up (reset) of the freezer after power failure.

The example in the table is based on the assumption that the delay time is changed to 7 minutes. The delay time is set to 5 minutes at the factory.

Note:

- The setting range for delay time is between 2 and 15 minutes. The cool down of chamber temperature may be slow when the setting of delay time is over 8 minutes, depending on the installation environment.
- There is no need of changing the delay time when the capacity of power source is enough.

Table 7 Changing procedure for delay time (change from 5 minutes to 4 minutes)

	Description of operation	Key operated	Indication after operation
1		----	The current chamber temperature is displayed.
2	Press numerical value shift key for 5 seconds.		The first digit is flashed.
3	Set the figure to F05 with the numerical value shift key.		When pressed, the figure of settable digit changes.
4	Press set key.	SET	The current delay time is displayed. The first digit is flashed.
5	Set the figure to 004 with the numerical value shift key.		When pressed, the figure of the first digit changes.
6	Press set key.	SET	The delay time is memorized and the current chamber temperature is displayed.

- The start up may be behind the delay time set by the above procedure because the compressor is affected by the chamber temperature and temperature of cascade condenser installed in the freezer. (The high stage side compressor starts to operate without delay time at the time of power on or after power failure.)
- The set mode returns to the temperature display mode automatically when 90 seconds has passed without any key operation. In this case, any setting before pressing set key (SET) is not memorized.

DEFROSTING

CAUTION

Do not defrost inside walls using a knife or ice pick. There are pipelines for cooling behind the walls. Be careful not to damage the lines as this could cause a breakdown. Also, do not make a hole in the wall for installation of attachments.

Automatic defrosting

- Defrosting is carried out in a short period of time by a special heater built into the evaporator.
- During defrosting, the internal temperature may rise slightly, but this has almost no effect on the temperature of the stored items, so leave them in the freezer during defrosting. During defrosting, dF and the current chamber temperature is displayed alternately.
- Water resulting from defrosting flows through into the evaporating tray, in which the water automatically evaporates.

Note:

- Automatic defrosting is carried out with 12-hour cycle. When the defrost key (DEF) for approximately five seconds to start the defrosting process, the automatic defrosting of 12-hour cycle is started at this point.

Manual defrosting

In case of manual defrosting, perform key operations as follows:

1. Press the defrost key (DEF) for approximately five seconds to start the defrosting process. During defrosting, dF and the current chamber temperature is displayed alternately.
2. The unit automatically finishes the defrosting process and returns to normal operation.

Sub-heater switch

This freezer has a sub-heater for defrosting at the cold air outlet. When the sub-heater switch is ON, the blockage by frost inside the cold air line can be prevented.

Normally, set this switch in ON position.

When this switch is OFF, pay attention to the following:

- If this switch is OFF, the chamber temperature at the completion of defrosting is lower about 3°C than that when the switch is ON. Therefore, when opening the door is not frequent and the sample is stored for long period, OFF position is suitable.
- When opening the door very often or freezing the samples again and again, set this switch in ON position.

REMOTE ALARM TERMINAL

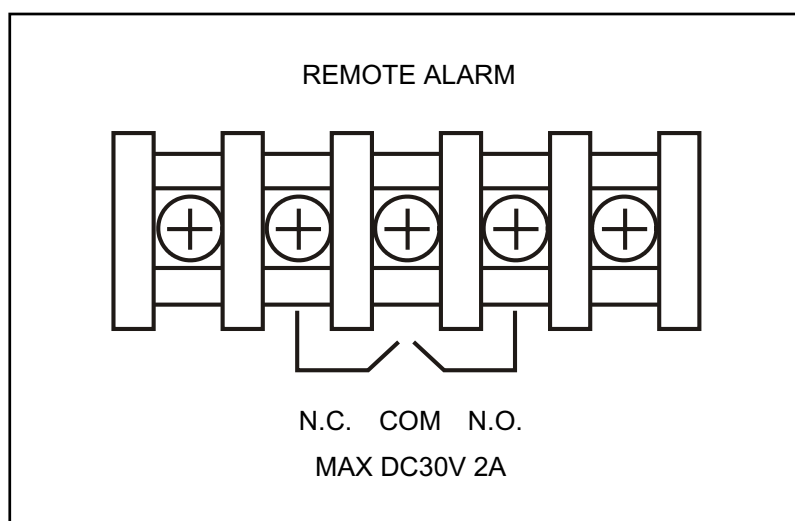
WARNING

Always disconnect the power supply cord before connecting an alarm device to the remote alarm terminal.

The terminal of the remote alarm is installed at the lower left side of the unit. The alarm is outputted from this terminal. Contact capacity is DC 30 V, 2 A.

Contact output:

	between COM. and N.O.	between COM. and N.C.
At normal	Open	Close
At abnormal	Close	Open



Note:

In this case, the alarm status of remote alarm terminal is not cancelled by pressing the alarm buzzer stop key (BUZZER).

ALARMS & SAFETY FUNCTIONS

This unit has the alarms and safety functions shown in Table 8, and also self diagnostic functions.

Table 8 Alarms and safety functions

Alarm & Safety	Situation	Indication	Buzzer	Safety operation
High temperature alarm	If the chamber temperature deviates by +15°C (factory set, changeable) from setting.	Alarm lamp is flashed. Chamber temperature is displayed flashed.	Intermittent tone with 15 minutes delay.	Remote alarm with 15 minutes delay.
Low temperature alarm	If the chamber temperature deviates by -15°C (factory set, changeable) from setting.	Alarm lamp is flashed. Chamber temperature is displayed flashed.	Intermittent tone with 15 minutes delay.	Remote alarm with 15 minutes delay.
Power failure alarm	When the power fails or power switch off or the plug for the freezer is pulled out of the outlet.	Alarm lamp is flashed.	Intermittent tone	Remote alarm.
Door alarm	When the door is opened.	Door lamp is lights.	Intermittent tone with 2 minutes delay.	-----
Filter check	When condenser filter is clogged.	Filter check lamp is brinks.	Intermittent tone	-----
Auto-return	When there is no key pressing in each setting mode for 90 seconds.	Chamber temperature is displayed.	-----	The setting mode is cancelled.

ALARMS & SAFETY FUNCTIONS

Alarm & Safety	Situation	Indication	Buzzer	Safety operation
Key lock	When the key lock is ON.	-----	-----	Change of setting is disable.
Thermal sensor abnormality	If the thermal sensor goes open circuit.	Alarm lamp is flashed. E01 and chamber temp. are displayed alternately.	Intermittent tone	Remote alarm. Continuous running of compressor.
	If the thermal sensor goes short circuit.	Alarm lamp is flashed. E02 and chamber temp. are displayed alternately.	Intermittent tone	Remote alarm. Continuous running of compressor.
Defrost sensor abnormality	If the defrost sensor goes open circuit.	Alarm lamp is flashed. E03 and chamber temp. are displayed alternately.	Intermittent tone	Remote alarm.
	If the defrost sensor goes short circuit.	Alarm lamp is flashed. E04 and chamber temp. are displayed alternately.	Intermittent tone	Remote alarm.
Filter sensor abnormality	If the filter sensor goes open circuit.	Alarm lamp is flashed. E05 and chamber temp. are displayed alternately.	Intermittent tone	Remote alarm.
	If the filter sensor goes short circuit.	Alarm lamp is flashed. E06 and chamber temp. are displayed alternately.	Intermittent tone	Remote alarm.
Ambient temperature sensor abnormality	If the ambient temperature sensor goes open circuit.	Alarm lamp is flashed. E07 and chamber temp. are displayed alternately.	Intermittent tone	Remote alarm.
	If the ambient temperature sensor goes short circuit.	Alarm lamp is flashed. E08 and chamber temp. are displayed alternately.	Intermittent tone	Remote alarm.
Battery switch check	When the battery switch is OFF during alarm test.	Alarm lamp is flashed. E09 is flashed.	Intermittent tone	-----
Condenser temp. abnormality	In the event of failure of fan motor for cooling the compressor	E10 and chamber temp. are displayed alternately.	Intermittent tone	Remote alarm. Compressor stops.
cascade sensor abnormality	If the cascade sensor goes open circuit.	Alarm lamp is flashed. E11 and chamber temp. are displayed alternately.	Intermittent tone	Remote alarm.
	If the cascade sensor goes short circuited.	Alarm lamp is flashed. E12 and chamber temp. are displayed alternately.	Intermittent tone	Remote alarm.
Battery check	When about 3 years has passed with power switch ON.	F1 and chamber temp. are displayed alternately.	-----	-----
Fan motor check	When about 6 years has passed with power switch ON.	F2 and chamber temp. are displayed alternately.	-----	-----

Note:

- When the operation is started in high ambient temperature, the filter check lamp is sometimes flashed. In this case, the lamp is off automatically when the chamber temperature is getting lower.
- The freezer resumes the operation after power failure with the temperature setting before power failure as the chamber temperature setting and alarm temperature setting are memorized in the nonvolatile memory.
- The chamber temperature is displayed for 5 seconds by pressing buzzer stop key (BUZZER) during power failure alarm. Then the buzzer is silenced. The alarm lamp keeps flashing.

ROUTINE MAINTENANCE

WARNING

Always disconnect the power supply to the unit prior to any repair or maintenance of the unit in order to prevent electric shock or injury.

Ensure you do not inhale or consume medication or aerosols from around the unit at the time of maintenance. These may be harmful to your health.

CAUTION

Always put on the dry gloves to protect the hands at the time of maintenance. No gloves may cause cut of the finger by the edge or corner.

Cleaning of cabinet

- Clean the unit once a month. Regular cleaning keeps the unit looking new.
- Use a dry cloth to wipe off small amounts of dirt on the outside and inside of the unit and all accessories. If the outside panels are dirty, clean them with a diluted neutral dishwashing detergent. (Undiluted detergent can damage the plastic components. For the dilution, refer to the instruction of the detergent.) After the cleaning with the diluted detergent, always wipe it off with a wet cloth. Then wipe off the cabinet or accessories with a dry cloth.
- Never pour water onto or into the unit. Doing so can damage the electric insulation and cause failure.
- The compressor and other mechanical parts are completely sealed. This unit requires absolutely no lubrication.

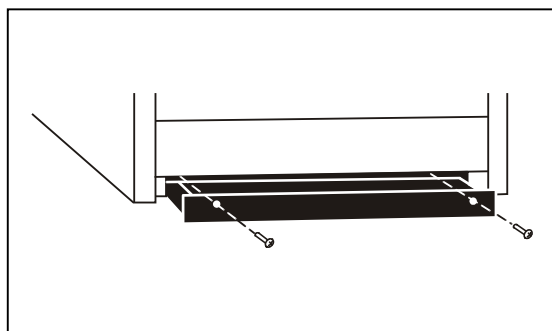
Cleaning of evaporating tray

CAUTION

Dispose of the water in the evaporating tray completely. Spilled water or splashed water may cause current leakage or electric shock.

Clean the evaporating tray regularly. The dusty tray may cause poor evaporation.

1. Remove two black screws at the lower front of the unit..
2. Pull the evaporating tray directly out; it is touching the floor. Pull it out by sliding it along the floor.
3. After cleaning, slide the evaporating tray along the floor.
By lifting up the back it can be pushed further inward.
4. Fix the evaporating tray with two black screws.



ROUTINE MAINTENANCE

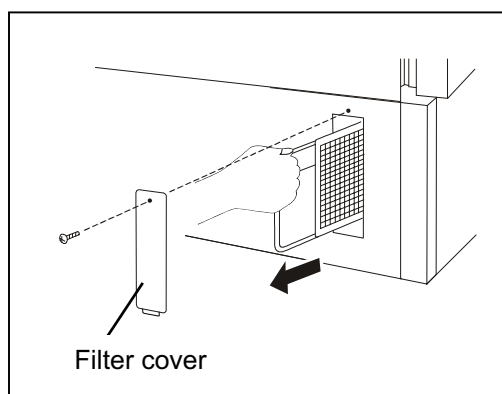
Cleaning of condenser filter

CAUTION

Never touch the condenser directly when the condenser filter is removed for cleaning. It may cause injury by heat.

This unit is provided with the filter check lamp. This lamp blinks and buzzer sounds when the condenser filter is clogged. Clean the condenser filter according to the following procedure. As a clogged condenser filter may cause poor cooling and compressor trouble, clean it once a year.

1. Turn the power switch OFF.
2. Remove a screw on the left side filter cover. The screw on the side has a cover.
3. Pull the condenser filter in the front of the condenser.
4. For cleaning dust and other foreign substances accumulated on the condenser filter surface, wash it with clean water and dry it naturally.
5. After cleaning, replace the condenser filter.
6. Replace and fix the left side filter cover with a screw and start up the units.



Defrosting of chamber

The frost can be formed on the inside panel when too wet materials are stocked or the access port is not capped completely.

In this case, remove the frost by using a scraper provided with the unit.

CAUTION

Never use knives or picks for defrosting on the inside panel. Use of such implements can damage the inside panel and lead to trouble.

REPLACEMENT OF BATTERY

Location of a nickel-metal-hydride battery

This unit is provided a nickel-metal-hydride battery for the power failure warning device. The battery is located in the electrical box inside the unit cover (Fig. 1). The battery needs to be replaced about every 3 years. For the replacement, contact Sanyo sales representative or agent.



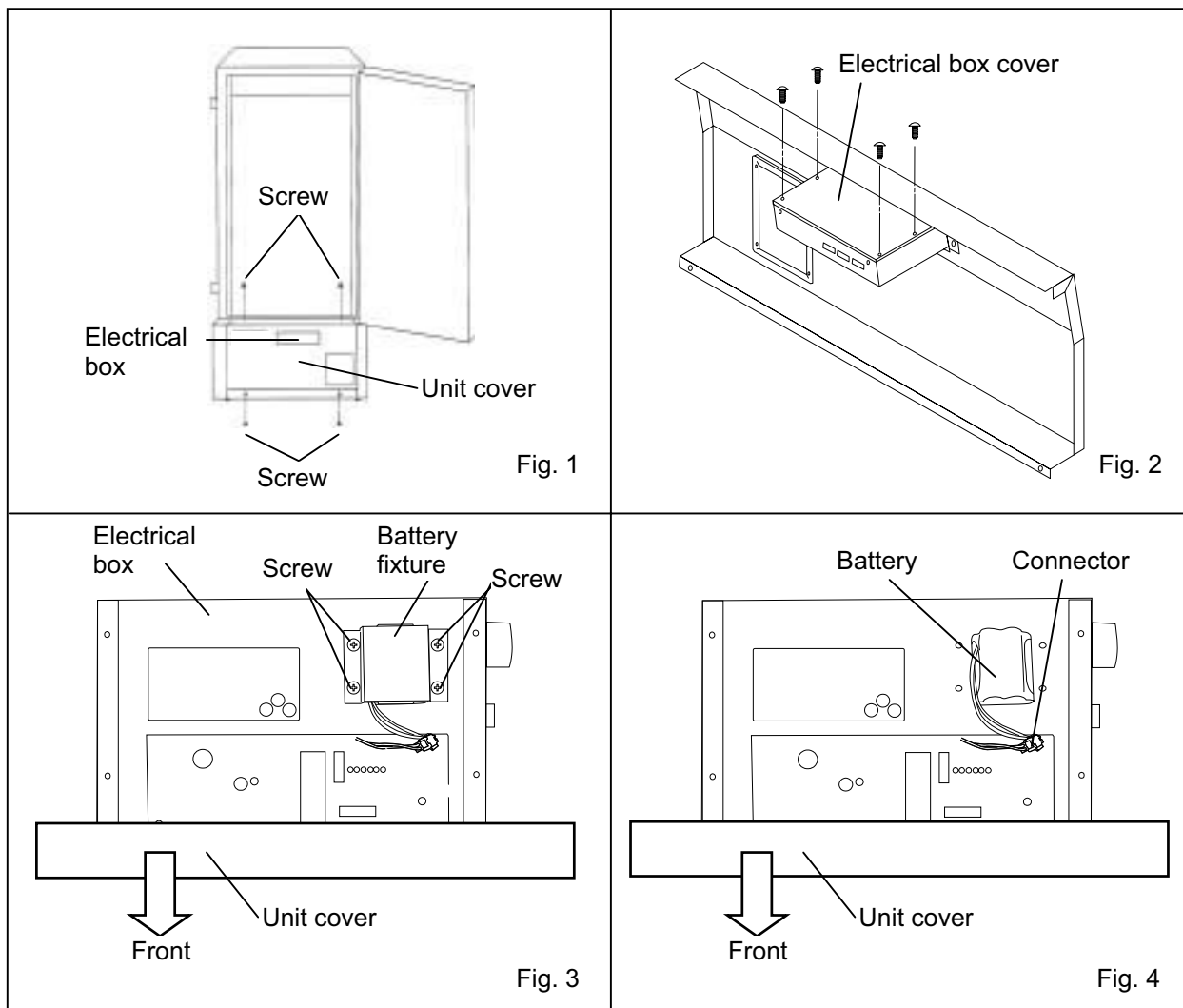
The high voltage components are enclosed in the electrical box. The cover should be removed by a qualified engineer or a service personnel only to prevent the electric shock.

Removal of nickel-metal-hydride battery

1. Turn off the power switch, battery switch, sub-heater switch and disconnect the power supply plug.
2. As shown in the Fig. 1, remove the unit cover by unscrewing four fixing screws with a screw driver.
3. Pull out the unit cover and then disconnect the connectors on the electrical box.
4. Remove four screws fixing the electrical box cover with a screw driver. (Fig. 2)
5. Remove four screws fixing the battery fixture. (Fig. 3)
5. Disconnect the connector of battery. (Fig. 4)
6. Take out the battery.

Handling of battery

Cover the battery terminal with an insulating tape to avoid the short circuit. Then follow the procedure for recycling or proper disposal.



TROUBLESHOOTING

If the unit malfunctions, check out the following before calling for service.

Malfunction	Check/Remedy
Nothing operates even when switched on	▪ The unit is not connected to the power supply. ▪ There is a power failure. ▪ The fuse is blown or the circuit breaker is activated.
The unit does not accept any key operation	▪ The key lock is "ON".
The alarm is activated.	< On start-up > The temperature in the unit does not match set value. < In use > ▪ The door was kept opened for long time. ▪ The set value was changed. ▪ The containers of high temperature (load) were put in the unit. In these cases, alarm is removed automatically by running the unit for several hours.
The cooling is poor	▪ The environmental temperature is too high. ▪ The door is not shut tightly. ▪ The filter is clogged. ▪ The freezer is in the direct sunlight. ▪ There is any heating source near the freezer. ▪ A rubber cap and insulation for the access port are not set correctly. ▪ You put too many unfrozen articles into the freezer compartment. ▪ The condenser filter is clogged. (Always clean the condenser filter when the filter check lamp blinks and buzzer sounds.)
The unit has condensation on the surface	▪ The freezer sometimes gets condensation under hot and humid weather or depending on environment of installation site. This is not malfunction. Wipe off the condensation with a dry cloth.

Note:

If the malfunction is not eliminated after checking the above items, or the malfunction is not shown in the above table, contact Sanyo sales representative or agent.

DISPOSAL OF UNIT

WARNING

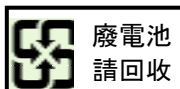
If the unit is to be stored unused in an unsupervised area for an extended period **ensure that children do not have access and doors cannot be closed completely.**

The disposal of the unit should be accomplished by appropriate personnel. Always remove doors to prevent accidents such as suffocation.

Recycle of battery



The unit contains a rechargeable battery. The battery is recyclable. At the end of its useful life, check with your local solid waste officials for proper disposal.



* Label indication is obliged to comply with Taiwanese battery regulation.

DISPOSAL OF UNIT

(English)

FOR EU USERS

The symbol mark and recycling systems described below apply to EU countries and do not apply to countries in other areas of the world.

Your SANYO product is designed and manufactured with high quality materials and components which can be recycled and/or reused.

The symbol mark means that electrical and electronic equipment, batteries and accumulators, at their end-of-life, should be disposed of separately from your household waste.

Note:

If a chemical symbol is printed beneath the symbol mark, this chemical symbol means that the battery or accumulator contains a heavy metal at a certain concentration. This will be indicated as follows: Hg: mercury, Cd: cadmium, Pb: lead

In the European Union there are separate collection systems for used electrical and electronic equipment, batteries and accumulators.

Please, dispose of them correctly at your local community waste collection/recycling centre.

Please, help us to conserve the environment we live in!

(German)

Für EU-Staaten

Das Symbol und das erwähnte Wiederverwertungssystem gelten nur für die Länder der EU und nicht für andere Länder oder Gebiete in der Welt.

Die Produkte von SANYO werden aus hochwertigen Materialien und Komponenten gefertigt, die sich wieder verwenden lassen.

Das Symbol bedeutet, dass elektrische oder elektronische Geräte, Batterien und Akkus am Ende ihrer Lebensdauer nicht im Haushaltsmüll entsorgt werden dürfen.

Hinweis:

Ein chemisches Zeichen unter dem Symbol bedeutet, dass die Batterie bzw. der Akku Schwermetalle in gewissen Konzentrationen enthält. Die Metalle werden wie folgt bezeichnet: Hg: Quecksilber, Cd: Kadmium, Pb: Blei

In der Europäischen Union gibt es separate Sammelstellen für elektrische und elektronische Geräte, Batterien und Akkus.

Entsorgen Sie solche Geräte bitte richtig in der kommunalen Sammelstelle bzw. im Recyclingzentrum.

Helfen Sie mit, die Umwelt in der wir leben, zu schützen.



DISPOSAL OF UNIT

(French)

POUR LES UTILISATEURS DE UE

Le symbole et les systèmes de recyclage évoqués ci-dessous s'appliquent uniquement aux pays de UE.

Votre produit SANYO est conçu et fabriqué avec des composants et des matériaux de hautes qualités qui peuvent être recyclés et/ou réutilisés.

Le symbole signifie que les équipements électriques et électroniques, les batteries et les accumulateurs ne doivent pas être mis au rebut avec les déchets domestiques à l'issue de leur durée de vie.

Remarque:

Si un symbole chimique est imprimé sous le symbole, le symbole chimique indique que la batterie ou l'accumulateur contient une certaine concentration de métaux lourds. Les métaux sont indiqués de la manière suivante: Hg: mercure, Cd: cadmium, Pb: plomb.

Il existe différents systèmes de collecte pour les équipements électriques et électroniques, les batteries et les accumulateurs usagés au sein de l'Union européenne.

Veuillez mettre les équipements au rebut de manière correcte, auprès de votre centre de recyclage/de collecte des déchets local.

Aidez-nous à préserver l'environnement dans lequel nous vivons!

Les machines ou appareils électriques et électroniques contiennent fréquemment des matières qui, si elles sont traitées ou éliminées de manière inappropriée, peuvent s'avérer potentiellement dangereuses pour la santé humaine et pour l'environnement.

Cependant, ces matières sont nécessaires au bon fonctionnement de votre appareil ou de votre machine. Pour cette raison, il vous est demandé de ne pas vous débarrasser de votre appareil ou machine usagé avec vos ordures ménagères.

(Spanish)

PARA USUARIOS DE LA UNION EUROPEA

El símbolo y los sistemas de reciclado descritos a continuación se aplican para países de la Unión Europea y no se aplica para países en otras áreas del mundo.

Su producto SANYO fue diseñado y fabricado con materiales de alta calidad y componentes que pueden ser reciclados y/o vueltos a usar.

El símbolo significa que los equipos eléctricos y electrónicos, baterías y acumuladores, al final de su vida útil, debe ser desechados separadamente de sus residuos domiciliarios.

Nota:

Si hay un símbolo químico impreso debajo del símbolo, este símbolo químico significa que la batería o acumulador contiene una cierta concentración de un metal pesado. Esto es indicado de la siguiente manera: Hg: mercurio, Cd: cadmio, Pb: plomo

En la Unión Europea hay sistemas de recolección separados para equipos eléctricos y electrónicos, baterías y acumuladores usados.

Por favor, disponga de ellos correctamente en el centro de recolección de residuos/reciclado de la comunidad de su localidad.

Por favor, ayúdenos a proteger el medio ambiente en que vivimos!



DISPOSAL OF UNIT

(Portuguese)

PARA UTILIZADORES DA UE

O símbolo e os sistemas de reciclagem descritos abaixo aplicam-se aos países da UE e não se aplicam aos países noutras áreas do mundo.

O seu produto SANYO foi concebido e fabricado com materiais e componentes de elevada qualidade que podem ser reciclados e/ou reutilizados.

O símbolo significa que o equipamento eléctrico e electrónico, baterias e acumuladores, em final de vida, não devem ser deitados fora juntamente com o lixo doméstico.

Atenção:

Se estiver impresso um símbolo químico debaixo do símbolo de , este símbolo químico significa que a bateria ou acumulador contém um metal pesado numa determinada concentração. Estará indicado da seguinte forma: Hg: mercúrio, Cd: cádmio, Pb: chumbo

Na União Europeia existem sistemas de recolha separados para equipamento eléctrico e electrónico, baterias e acumuladores.

Por favor, entregue-os no seu centro de reciclagem/recolha de lixo local.

Por favor, ajude-nos a conservar o ambiente!

(Italian)

PER UTENTI UE

Il simbolo e i sistemi di riciclaggio descritti di seguito si applicano esclusivamente ai paesi dell'UE.

Questo prodotto SANYO è stato progettato e realizzato con materiali e componenti di elevata qualità che possono essere riciclati e/o riutilizzati.

Il simbolo di riciclaggio mostrato di seguito indica che i dispositivi elettrici ed elettronici, le batterie e gli accumulatori, una volta esauriti, devono essere smaltiti separatamente rispetto ai rifiuti domestici.

Nota:

Se sotto il simbolo di riciclaggio appare un simbolo chimico, esso sta ad indicare che la batteria o l'accumulatore contengono metalli pesanti a determinate concentrazioni. Questo viene specificato come segue: Hg: mercurio, Cd: cadmio, Pb: piombo.

Nell'Unione europea esistono diversi sistemi per la raccolta dei rifiuti speciali quali i dispositivi elettrici ed elettronici, le batterie e gli accumulatori.

Si raccomanda di provvedere allo smaltimento di tali rifiuti secondo quanto previsto dalle normative vigenti in materia.

Aiutaci a conservare l'ambiente!



DISPOSAL OF UNIT

(Dutch)

VOOR GEBRUIKERS IN DE EU

Het symbool en de recycleersystemen die hieronder beschreven worden, zijn van toepassing op de landen in de EU en zijn niet van toepassing op landen in andere delen van de wereld.

Uw SANYO product is ontworpen en gemaakt met materialen en onderdelen van hoge kwaliteit, die gerecycleerd en opnieuw gebruikt kunnen worden.

Het symbool betekent dat elektrische en elektronische apparatuur, batterijen en accu's aan het eind van hun leven apart van uw huisafval weggegooid moeten worden.

Let op:

Indien een chemisch symbool afgedrukt staat onder het symbool, betekent dit chemisch symbool dat de batterij of accu een zwaar metaal met een bepaalde concentratie bevat. Dit wordt als volgt aangegeven: Hg: kwik, Cd: cadmium, Pb: lood

In de Europese Unie zijn afzonderlijke inzamelingssystemen voor gebruikte elektrische en elektronische apparatuur, batterijen en accu's.

Wilt u deze op de juiste manier weggooien bij uw plaatselijk afvalinzameling-/recyclingcentrum in uw buurt?

Help ons het milieu waarin wij leven in stand te houden!

(Swedish)

FÖR ANVÄNDARE INOM EU

Den symbolmärkning och de återvinningssystem som beskrivs här nedan gäller länder inom EU och gäller inte länder i någon annan del av världen.

Din SANYO-produkt har konstruerats och tillverkats med delar och material av hög kvalitet, som kan återvinnas och/eller återanvändas.

Symbolmärkningen innebär att elektrisk och elektronisk utrustning, batterier och ackumulatorer, vid slutet av deras livslängd, inte får slängas som hushållsavfall utan skall slängas separat.

Observera:

Om en kemisk symbol finns tryckt under denna symbolmärkning, betyder denna kemiska symbol att batteriet eller ackumulatören innehåller en tungmetall med en viss koncentration. Detta indikeras på följande sätt: Hg: kvicksilver, Cd: kadmium, Pb: bly

I den Europeiska Unionen finns det separata uppsamlingssystem för använd elektrisk och elektronisk utrustning, batterier och ackumulatorer.

Gör dig av med sådana saker på rätt sätt på den speciella lokala platsen för återsamling/återanvändning.

Hjälp oss att bevara den miljö vi lever i!



TEMPERATURE RECORDER (OPTION)

WARNING

Always disconnect the power supply to the unit prior to attachment of a temperature recorder in order to prevent electric shock or injury.

If the warning is required for the internal temperature record or the interior temperature deviates from the target temperature, an optional temperature recorder (MTR-4015LH or MTR-85H) is available. Install the recorder properly as described below.

Setting of MTR-4015LH

Pull the knob on the upper part of the recorder forward to change the recording chart or battery.

Setting of recording chart

1. The information on the recording chart is shown in Fig. 1.

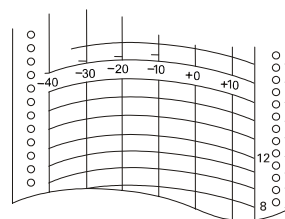


Fig. 1

2. Pull the cartridge up after opening the top lid. The lid can be opened by turning the knob counterclockwise. See Fig. 2.

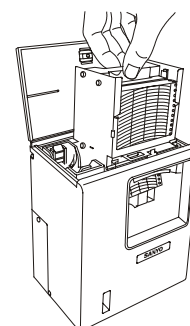


Fig. 2

3. As shown in Fig. 3, insert the recording chart with the “begin” tab placed in the cartridge. Check that the printed side is facing out.

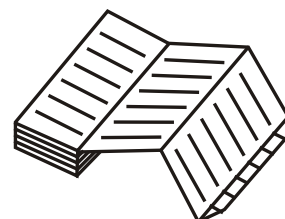


Fig. 3

4. Place the recording chart beneath the arm and between the plate spring and guide plate in the direction of the arrow.

Note:

- Do not scratch or put pressure on the recording chart.
- Do not bend the recording chart.
- Do not reverse the recording chart manually.

The used paper left in the used recording chart compartment can cause a malfunction. Be sure to remove it. See Fig. 4.

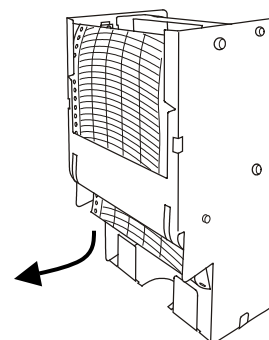


Fig. 4

TEMPERATURE RECORDER (OPTION)

5. Place the recording chart between the guide and the guide plate. Slide the recording chart along the guide plate so that the recording chart will not be forced out of the date/hour slot. See Fig. 5.

6. After ascertaining that the holes on the side of the chart are locked into the teeth of the sprocket, turn the gear and send the chart into the used chart compartment.

Setting of time

1. Turn the gear on the date/hour slot to the desired time.
2. After properly folding the recording chart in the used or unused chart compartment, replace the cartridge.

Removing of the used recording chart

After recording, take out the cartridge and remove the recording chart from the recording chart outlet. If not all of the recording chart has been fed into the used recording chart compartment, send all the recording chart in the compartment first turning the gear.

Battery replacement

To replace the battery, turn the knob counterclockwise to open the lid. Place the battery in the battery case according to the plus-minus indications on the bottom of the battery case. See Fig. 6. At the time of the first use the battery.

Start-up

1. The quartz motor is started by placing a "R14" or size "C" dry cell battery in the battery case.
2. Check the operation of the recorder using the quartz motor rotation check gear.
3. Replace the battery once a year.

Stopping

The temperature recorder is stopped by taking the battery out of the battery case.

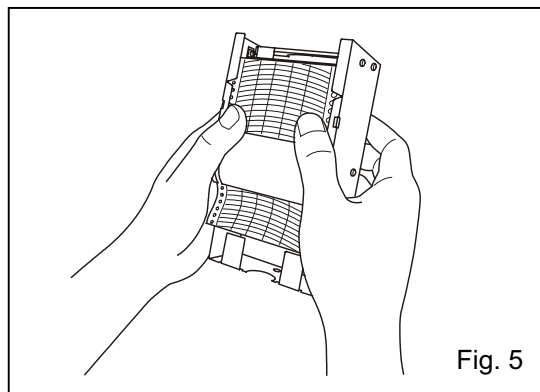


Fig. 5

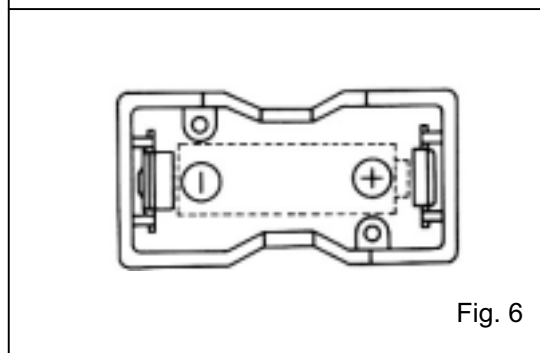
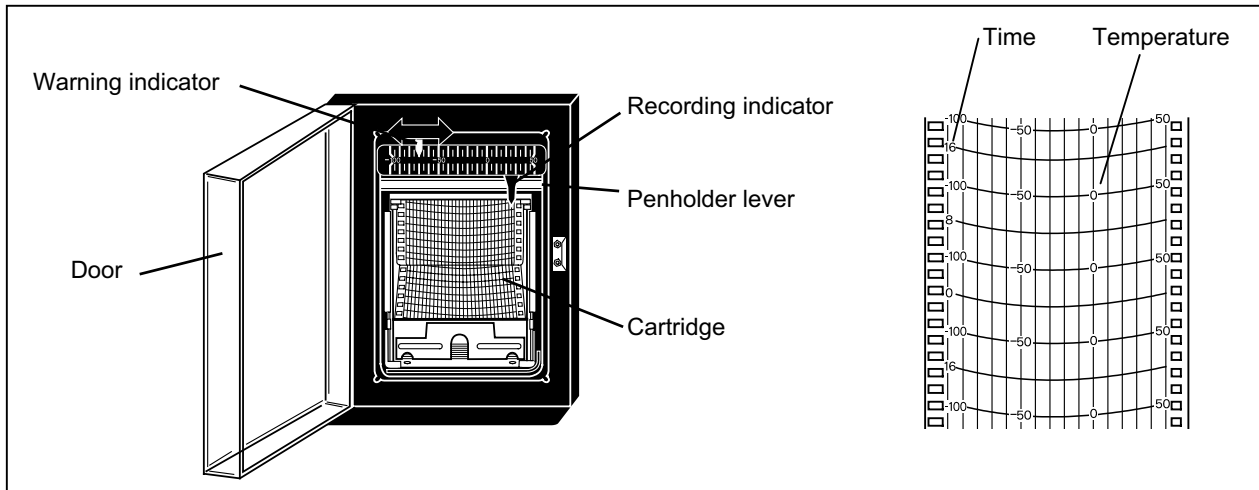


Fig. 6

TEMPERATURE RECORDER (OPTION)

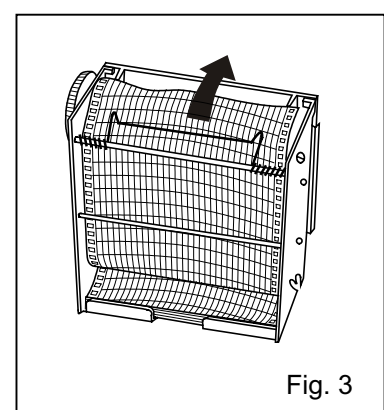
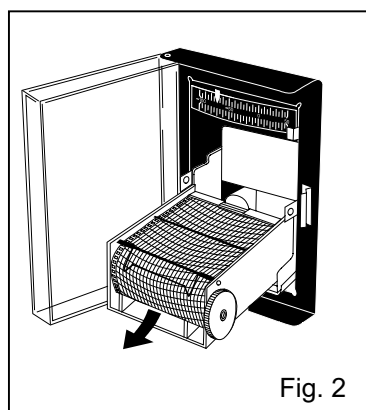
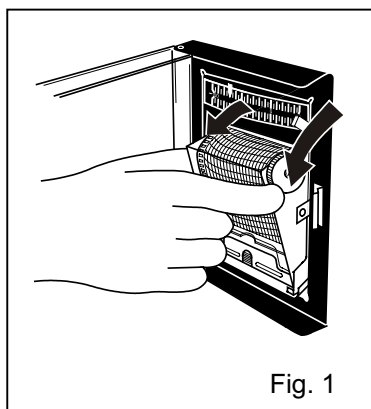
Setting of MTR-85H

The figure below shows the description of a temperature recorder. The temperature recorder is provided as an option.



Feeding of recording chart

1. Open the door and let down the pen-holder lever; the pen point is apart from the recording chart. (Fig. 1)
2. Pull the cartridge out of the mounted position. (Fig. 2)
3. Set a new recording chart in place on the rear bottom of the cartridge. Set the hole on the recording chart in the cog of the chart driving assembly and feed the recording chart in the direction of the arrow by driving the cog wheel.
4. Set the recording chart according to the mark of day and time. (Fig. 3)
5. When mounting, lay down the cartridge first, and push into the mounting position with the groove set at the projection on the position.
6. Set up the cartridge and settle in position.
7. Open the door and let up the pen-holder lever.



TEMPERATURE RECORDER (OPTION)

Replacement of dry cell

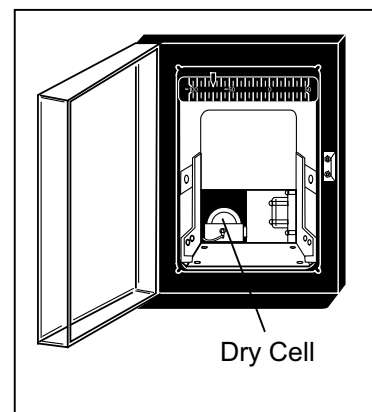
Replace the dry cell once a year as follows:

1. Put up the penholder lever first, then pull out cartridge from the mounted position.
2. Reset the battery cover with wire, on the bottom left side, and take out the dry cell.
3. Set a new dry cell by turning its anode to this side.
4. Shut the battery cover after exchanging dry cells. Mount the cartridge as before and lay up the pen-holder lever.

Note :

This temperature recorder is designed for the manganese dry cell and the alkaline dry cell.

Do not use a rechargeable battery because the initial voltage of such battery is low. The rechargeable battery may cause the malfunction of recorder or shorten the battery life significantly.



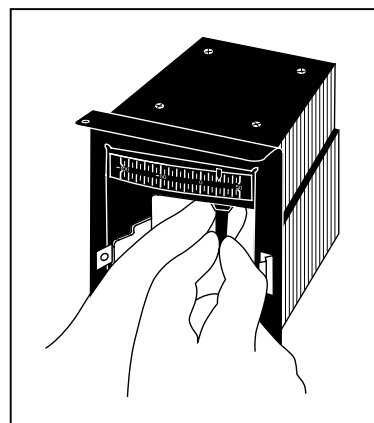
Setting of back-up temperature

1. There is the guide on the top of the temperature displayer. Adjust the guide with your finger to back-up temperature, at which temperature the auxiliary cooling system starts to operate.
2. Set at a temperature 15°C higher than that of the freezer compartment.

Penholder

Install a recording pen in the recording arm as shown in the figure. Make sure that the felt pen is completely inserted for accurate recording. The felt pen is packed together with the recording chart.

1. Let down the penholder lever, then pull out the cartridge from the mounted position.
2. Insert a new pen.
3. Mount the cartridge into place.
4. Lift up the pen-holder lever and make sure that the pen point touches the chart.



Note:

- Turn off the back-up switch when the units operation is stopped or the back-up system is not used. The battery for back-up system is discharged when the back-up switch is kept on.
- The additional felt pen or recording chart is available from Sanyo sales agency.
- To stop the temperature recorder, remove the dry cell from the temperature recorder. The back-up system can operate without recorder cell. Always remove a felt pen as well because the recording chart can be torn resulting from ink spot. The torn recording chart may interfere felt pen tip movement, which results in no activation of back-up system.
- The dry cell for recorder normally keeps about 1 year. However, the dry cell life is shorten depending on the ambient temperature condition. The enclosed dry cell may have shorter life since it is for monitor.
- The liquid leakage or rust can be caused when a used dry cell or a dry cell over effective limit is left as it is, which gives adverse effect on the temperature recorder.

Start-up

1. The quartz motor is started by placing a "R14" or size "C" dry cell battery in the battery case.
2. Check the operation of the recorder using the quartz motor rotation check gear.
3. Change the battery once a year.

TEMPERATURE RECORDER (OPTION)



WARNING

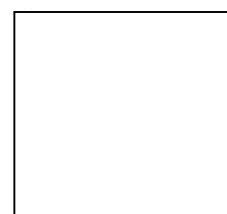
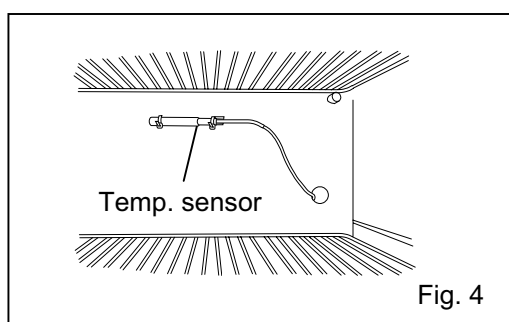
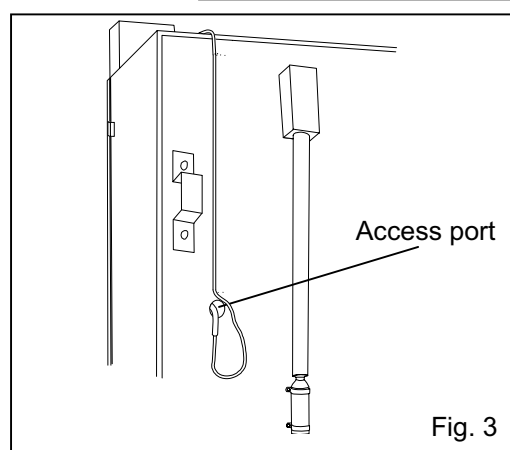
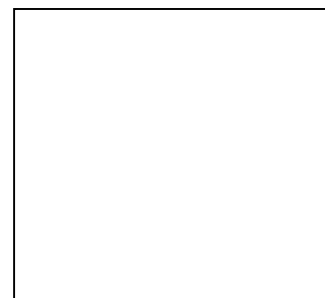
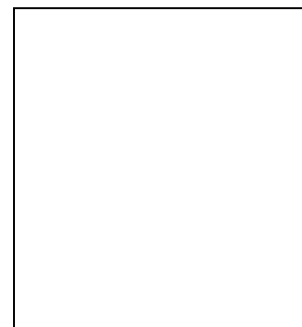
Disconnect the power supply plug before attaching the temperature recorder or it may cause electric shock or fire.

Installation of MTR-4015LH

An temperature recorder is available for this unit as an optional component. The type of the recorder is MTR-85H. Consult Sanyo sales representative or agent for the recorder installation.

Following shows the installation procedure.

1. Attach the fixture to the temperature recorder with two screws. (Fig. 1)
2. Remove the screws at the right corner on the top of the unit and fix the recorder to the attachment position. (Fig. 2)
3. Remove a rubber cap and insulation covering the access port on the back of the unit.
4. Take the temperature sensor into the units chamber through the access port.
5. Remove the temperature recorder cover, then install the temperature recorder to control panel by using the fittings enclosed with the temperature recorder. (Fig. 3)
6. By using the mounting screws and nylon clip, fix the covered temperature sensor as shown in the figure.(Fig. 4)
7. Make sure to arrange the capillary tube not to contact the mechanical compartment or stored items.
8. Cover the access port with the insulation and rubber cap having a cut. (Fig. 5)
9. Operate the freezer until the chamber temperature gets to the set temperature. Check the recorded temperature and chamber temperature displayed on the control panel. Adjust the zero adjustment volume on the temperature recorder so that the recorded temperature can corresponds with the displayed temperature if they are not compliance each other.



TEMPERATURE RECORDER (OPTION)



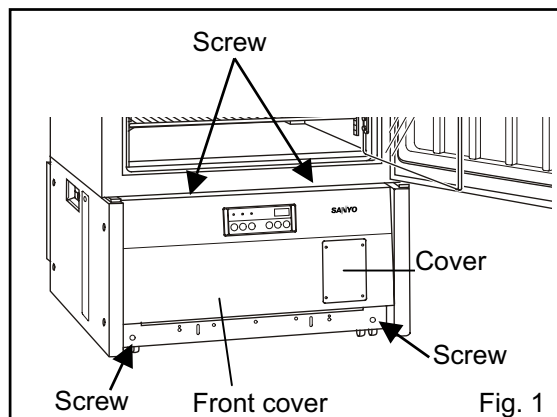
WARNING

Disconnect the power supply plug before attaching the temperature recorder or it may cause electric shock or fire.

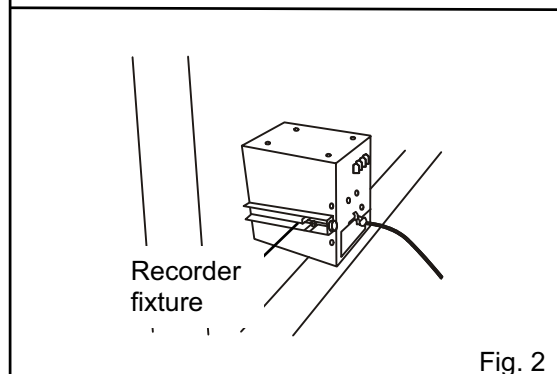
Installation of MTR-85H

An temperature recorder is available for this unit as an optional component. The type of the recorder is MTR-85H. Consult Sanyo sales representative or agent for the recorder installation. Following shows the installation procedure.

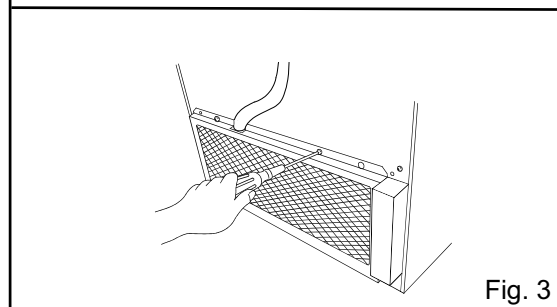
1. Remove four screws (shown by arrows) on the front panel off. (Fig. 1) Then take off the cover for the recorder mounting space by removing four screws.



2. As shown in the Fig. 2, insert the temperature recorder to the mounting space and fix it to the back side of the cover by using the recorder fixture enclosed with the temperature recorder.



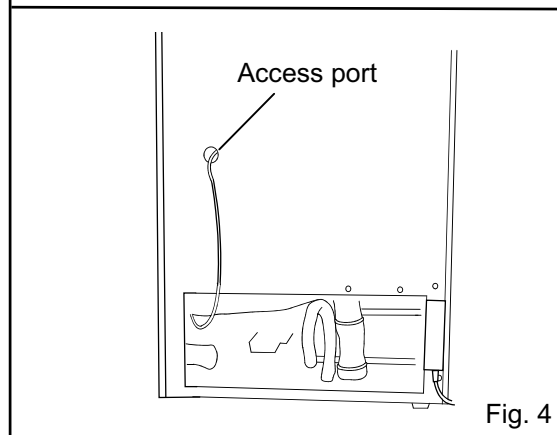
5. Remove the wire grille on the back bottom of the unit. See Fig. 3



6. Route the capillary tube of the recorder to the back of the unit through the unit compartment

7. Remove 2 rubber caps (outside and inside) on the access port on the back of the unit and also remove the insulation in the port.

8. Pass the recorder sensor into the chamber through the access port. (Fig. 4)



TEMPERATURE RECORDER (OPTION)

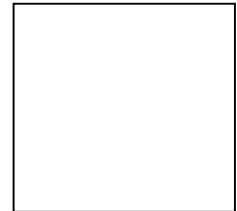
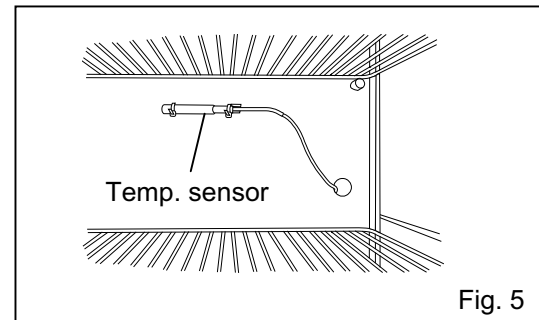
9. After covering the recorder sensor with the cover provided, fix the recorder sensor under the 3rd shelf by using 2 enclosed binders. See Fig. 5.

10. Make a small cut on the rubber caps for capillary to pass. See Fig. 6

11. Replace the insulation into the access port and cover the hole completely with the rubber caps.

12. Place the temperature sensor cover over the temperature sensor.

13. Operate the freezer until the chamber temperature gets to the set temperature. Check the recorded temperature and chamber temperature displayed on the control panel. Adjust the zero adjustment volume on the temperature recorder so that the recorded temperature can corresponds with the displayed temperature if they are not compliance each other



SPECIFICATIONS

Name	Biomedical Freezer
Model	MDF-U443
External dimensions	W800 x D832 x H1,810 (mm)
Internal dimensions	W640 x D615 x H1,090 (mm)
Effective capacity	426 L
Exterior	Painted steel
Interior	Stainless steel plate
Door	Painted steel
Inner door	Acrylic resin, 2 doors
Shelf	Polyethylene coated wire, 5 shelves, Max. load; 50 kg/shelf
Access port	Inner diameter 40 mm, Left side
Insulation	Rigid polyurethane foamed-in place
Compressor	Hermetic rotary type (high stage side), Hermetic reciprocate type (low stage side)
Compressor motor	Output 400 W (high stage side), Output 750 W (low stage side)
Evaporator	Shell and tube type (high stage side), Fin and tube type (low stage side)
Condenser	Fin and tube type (high stage side), Shell and tube type (low stage side)
Condenser fan motor	10 W
Cooling fan motor	9 W (in the chamber)
Refrigerant	R-134a (high stage side), R-404A (low stage side)
Temperature control	Microprocessor control system
Temperature display	Digital display
Temperature sensor	Thermister sensor
Alarm	High temperature alarm, Low temperature alarm, Power failure alarm, Door alarm
Remote alarm contact	Allowable capacity: 30 VDC, 2 A
Battery	For power failure alarm; Nickel-metal-hydride battery, 6 VDC, 1100 mAh, Auto-recharge (5HR-AAC)
Weight	213 kg
Accessories	1 set of key, 1 temperature sensor cover, 2 nylon clips, 1 scraper
Optional component	Automatic temperature recorder (MTR-4015LH, MTR-85H)

Note:

- Design or specifications will be changed without notice.
- The battery for power failure alarm is an article for consumption. It is recommended that the battery will be replaced about every 3 years. Contact Sanyo sales representative or agent at the time of replacement of the battery for recycling.
- Fan motors are expendable supplies. Replace them for about every 6 years. Contact Sanyo sales representative or agent at the time of replacement of the fan motor.

PERFORMANCE

Cooling performance	-40°C (center of chamber) (ambient temperature; 35°C, no load)			
Temperature control range	-15°C to -40°C			
Rated voltage	AC 220 V	AC 220 V	AC 230 V	AC 240 V
Rated frequency	60 Hz	50 Hz	50 Hz	50 Hz
Rated power consumption	670 W	630 W	640 W	680 W
Noise level	51 dB (A scale)			
Maximum pressure	1670 kPa			

Note : The unit with CE mark complies with EC directives 89/336/EEC, 93/68/EEC and 73/23/EEC.

CAUTION

Please fill in this form before servicing.
Hand over this form to the service engineer to keep for his and your safety.

Safety check sheet

1. Freezer contents : ☐ Yes ☐ No
Risk of infection: ☐ Yes ☐ No
Risk of toxicity: ☐ Yes ☐ No
Risk from radioactive sources:

(List all potentially hazardous materials that have been stored in this unit.)

Notes :

2. Contamination of the unit ☐ Yes ☐ No
Unit interior ☐ Yes ☐ No
No contamination ☐ Yes ☐ No
Decontaminated ☐ Yes ☐ No
Contaminated
Others:

3. Instructions for safe repair/maintenance of the unit ☐ Yes ☐ No
a) The unit is safe to work on ☐ Yes ☐ No
b) There is some danger (see below)

Procedure to be adhered to in order to reduce safety risk indicated in b) below.

Date :

Signature :

Address, Division :

Telephone :

Product name : Biomedical Freezer	Model : MDF-U443	Serial number :	Date of Installation :
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Please decontaminate the unit yourself before calling the service engineer.



SANYO Electric Co., Ltd
Printed in Japan